



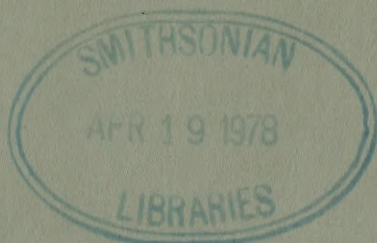
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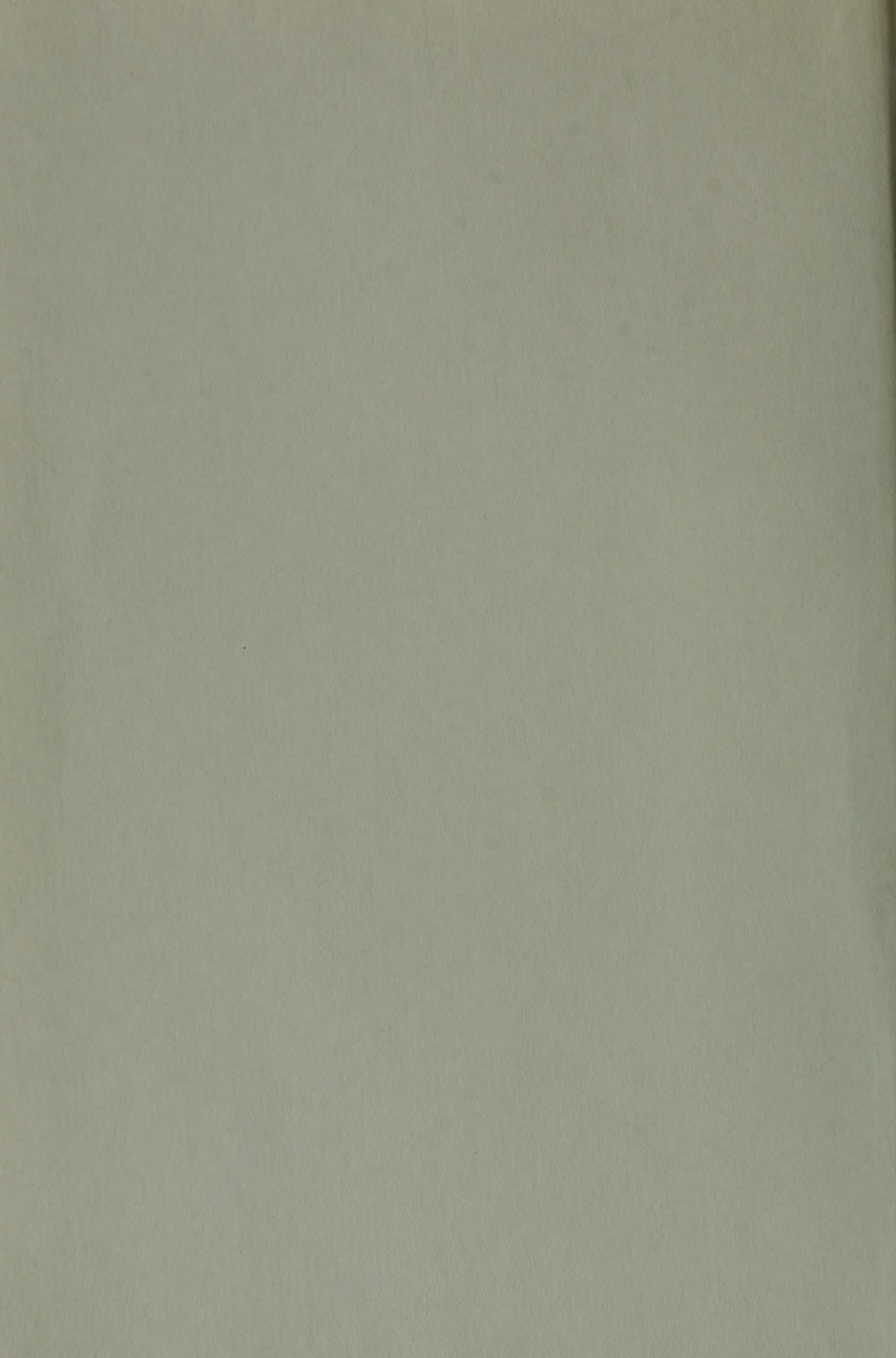
Volume XXI

B.K. Shishkin, Editor

*Labiatae*



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Akademiia Nauk SSSR. Botanicheskii Institut.

# **FLORA of the U.S.S.R.**

(Flora SSSR)

(Series initiated by V.L. Komarov)

## **Volume XXI**

### ***Labiatae***

Chief Editor B.K. Shishkin  
Volume Editor B. K. Shishkin

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## SUBJECTS AND CONTRIBUTORS

Genera: Eremostachys, Phlomis, Lagochillus, Molucella, Metastachys, Stachys, Betonica, Phlomidioschema . . . . .	Arranged by O.E. Knorring
Genera: Stachyopsis, Chaiturus, Leonorus, Panzeria, Chamaesphacos . . . . .	Arranged by L.A. Kupriyanova
Genera: Galeopsis, Erianthera, Ziziphora . . . . .	Arranged by S.V. Yuzepchuk
Genera: Lamium, Galeobdolon, Wiedemannia, Otostegia, Perovskia, Perilla . . . . .	Arranged by S.G. Gorshkova
Genus Ballota . . . . .	Arranged by A.I. Poyarkova
Genera: Salvia, Schraderia . . . . .	Arranged by E.G. Pobedimova
Genera: Melissa, Satureia, Micromeria, Calamintha, Clinopodium, Acinos, Amaracus, Hyssopus, Majorana, Origanum, Mentha, Gontscharovia . . . . .	Arranged by A.G. Borisova
Genus Thymus . . . . .	Arranged by M.V. Klovov
Genera: Lycopus, Orthodon, Elsholzia, Dysophylla, Plectranthus, Ocimum . . . . .	Arranged by E.V. Volkova

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Addenda XX – Diagnoses planatarum novarum in tomo XXI  
Florae URSS commemoratarum.

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The alphabetic indexes were compiled by N.F. Zvorykina.





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## PREFACE

Volume XXI completes the treatment of Labiatae; it covers 44 additional genera with a total of 544 species. The whole family, represented by 913 species, thus closely approaches grasses in range. This volume contains two new genera, *Metastachys* Knorr. and *Gontscharovia* Boriss.; there are also revised descriptions of about one hundred new species. New descriptions are given partly in Addenda XX and partly in the next volume of "Botanical Materials of the Herbarium of the Komarov Botanical Institute of the Academy of Sciences of the U.S.S.R."

The largest genus in Volume XXI is *Thymus*, treated by M. V. Klovov. Species of this genus, like those of *Ziziphora* (treatment by S. V. Yuzepchuk), are perhaps presented by the authors with excessive differentiation.

A. I. Vvedenskii, the renowned expert on the vegetation of Central Asia, has contributed valuable suggestions concerning the treatment of the genera *Eremostachys*, *Phlomis* and *Lagophilus*.

Many Labiatae described in this volume are of medicinal value or yield essential oil. Some species are used in the food industry.

The Editors



1 Genus 1265.\* **Eremostachys\*\*** Bge.

Bge. in Ldb. Fl. alt. II (1830) 414; Popov, Monografiya v Novykh Memuarakh Mosk. obshch. isp. prik. XIX (1940) 48.

Calyx tubular-campanulate or broadly infundibular, the 5 short teeth broadly truncate or rounded, ovate or triangular, always terminating in a prickly point 1.5 to 7 mm long; ovate-triangular auricles often present between the teeth; in some species calyx-limb membranous, strongly expanded, with shallow obtuse short-mucronate lobes; corolla with bilabiate limb; upper lip narrow, arched, mostly bearded at margin inside (rarely beardless); lower lip 3-lobed, the middle lobe mostly broader than the others; stamens 4; pectinately fringed or deeply incised appendages present in most species on upper filaments, sometimes on all filaments, varying in shape, longitudinal or transverse and then the filament base with a small scale across the corolla tube, rarely the appendages papillary; a ring of short hairs present within the corolla tube, at base or in middle part, in some species absent (series Speciosae); style lobes most unequal.

The review of this genus is based on the monograph of M. G. Popov, but subdivision is into series, the category "grec" in the monograph being equivalent to "series" in the "Flora of the USSR."

Insufficiency of material relating to species from Central Asia and from the Caucasus made it impossible to ascertain the scope of certain species; some of Popov's varieties may deserve the status of independent species. Early investigators of this genus, such as Bunge and Bentham, already pointed out that many of its species show close affinity to *Phlomis* (sect. *Phlomoides*) and to *Moluccella*. Regel also described a number of 2 species which he referred to the genus *Phlomis* and subsequently transferred to *Eremostachys*. The taxonomic affinity between *Eremostachys* and the section *Phlomoides* of the genus *Phlomis* is also indicated by M. G. Popov.

There is no doubt that the genus *Eremostachys* is in need of revision. Some species would have to be transferred to *Phlomis*, retaining in the genus *Eremostachys* only the section *Moluccelloides* Bge. which is characterized by napaceous roots, infundibuliform calyx with expanded limb, as well as distinctive leaves and indument. In this work we present the genus in its former range.

**Economic importance.** Some species are of potential value as ornamentals on account of their large, brightly colored flowers; a few species contain essential oil.

- |    |  |     |
|----|--|-----|
| 1. | Calyx expanded toward apex; root tuberous . . . . .  | 2.  |
| +  | Calyx not expanded toward apex, limbless; root fibrous, the rootlets thickened in some species (Section 1. <i>Phlomoides</i> Bge.) . . . . . | 13. |

\* Treatment by O. E. Knorring.

\*\* From Greek *eremos*, desert, and *stachys*, spike.

2. Calyx tubular-campanulate or campanulate, in fruit with large reclinate teeth, the coriaceous limb short, inconspicuous; leaves pinnatisect, rarely entire (Section 2. *Metaxoides* Briq.). . . . . 7.
- + Calyx infundibular, the limb very broad, membranous, rotate, campanulate or patelliform; leaves entire (Section 3. *Moluccelloides* Bge.). . . . . 3.
3. Corolla unicolor, white turning yellowish, nearly twice the length of calyx; calyx glabrous, 15–19 mm long; bracts absent or obsolescent . . . . . 49. *E. tuberosa* (Pall.) Bge.
- + Corolla bicolor; calyx pubescent . . . . . 4.
4. Upper corolla lip yellow, the lower orange or bright yellow; calyx infundibular, the tube narrowly campanulate; bracts subulate or filiform-linear, 9–15 mm long, one-fourth to one-third as long as calyx . . . . . 51. *E. molucelloides* Bge.
- + Upper corolla lip white, the lower yellow; calyx broadly campanulate . . . . . 5.
5. Limb of fruiting calyx strongly expanded, elongate-rotate; calyx teeth broadly triangular, sometimes confluent, obtuish; bracts filiform, one-third to half as long as calyx . . . . . 52. *E. rotata* Schrenk.
- + Calyx limb infundibular . . . . . 6.
6. Leaves ovate or orbicular, with lacerate-dentate margin; calyx teeth broadly rounded, 2–3 mm long including point; bracts absent . . . . . 50. *E. affinis* Schrenk.
- 3 + Leaves rounded-ovate to oblong-ovate, the margin with rounded teeth; bracts filiform, 10–12 mm long; calyx teeth ovate-lanceolate, 11 mm long including point . . . . . 48. *E. mogianica* M. Pop.
7. Leaves simple, ovate or rounded-ovate . . . . . 8.
- + Leaves pinnatipartite, pinnatisect or pinnatilobate . . . . . 11.
8. Leaves rather densely shaggy beneath, at least on the veins, with simple straight articulate hairs . . . . . 9.
- + Leaves arachnoid above, glabrous beneath; whorls 2-flowered, with long bracts . . . . . 46. *E. aralensis* Bge.
9. Calyx 20–25 mm long; corolla 30–35 mm long, exserted, the lower lip ca. 20 mm broad . . . . . 47. *E. tianschanica* M. Pop.
- + Calyx 14–20 mm long; corolla 20–27 mm long, barely exserted, the lower lip 10 mm broad . . . . . 10.
10. Stem sparsely villous; calyx 14–17.5 mm long; corolla 20–25 mm long; spines of calyx teeth slender . . . . . 44. *E. phlomoides* Bge.
- + Stem very densely villous, white; corolla to 27 mm long; spines of calyx teeth thicker and stronger . . . . . 45. *E. desertorum* Rgl.
11. Verticillasters 2-flowered . . . . . 12.
- + Verticillasters 4- or rarely 6-flowered, the upper 2-flowered; leaves pinnatipartite, the lobes irregularly triangular-ovate, unevenly toothed; calyx 15–26 mm long, densely covered beneath with branched and furcate hairs . . . . . 41. *E. subspicata* M. Pop.
12. Calyx teeth short-ovate, terminating in spine 1.5–2 mm long; calyx 14–15 mm long, covered with multicellular moniliform as well as branched hairs; appendages of upper filaments broad, fimbriate, those of lower stamens pectinate . . . . . 42. *E. boissieriana* Rgl.



- + Calyx teeth broadly rounded, 2.5–4 mm long, terminating in prickle 3–4 mm long; calyx 15–27 mm long, its indument as in the preceding species but also containing glandular hairs; fringed appendages confined to upper filaments. . . . . 43. **E. regeliana** Aitch. et Hemsl.
13. Ring of hairs within calyx tube absent or rudimentary. . . . . 14.
- 4 + Ring of hairs within calyx tube well developed. . . . . 26.
14. Leaves mostly simple, oblong-elliptic or lyrate-pinnate; calyx covered with stellate, long, simple and glandular hairs . . . . . 15.
- + Leaves mostly pinnatipartite or pinnatisect or, if simple elliptical, then calyx teeth broad, with prickle 2–4 mm long . . . . . 18.
15. Corolla white, 35–38 mm long; bracts linear-subulate, 8–9 mm long; calyx teeth triangular . . . . . 35. **E. pulchra** M. Pop.
- + Corolla bright yellow, 35–40 mm long; bracts lanceolate, the outer ovate, 12–17 mm long . . . . . 16.
16. Calyx teeth broad, with spine 4–5 mm long. . . . . 34. **E. popovii** Gontsch.
- + Calyx teeth short, triangular, with rigid spine 1–1.5 mm long; corolla yellow. . . . . 17.
17. Radical leaves oblong-elliptical, with large short lobes or pinnatilobate, the margin of lobes crenate . . . . . 33. **E. baldschuanica** Rgl.
- + Radical leaves elliptic-oblong, more or less pinnatisect or deeply lobed, the lobes oblong-lanceolate or ovate with coarsely and doubly crenate-dentate margin . . . . . 32. **E. fulgens** Bge.
18. Leaves simple . . . . . 19.
- + Leaves mostly lyrate-pinnatipartite, pinnatisect or bipinnatipartite, rarely simple . . . . . 21.
19. Radical leaves narrowly elliptic, with crenate-dentate margin, covered with stellate hairs; calyx 20 mm long, with short broad teeth, covered in upper part with branched hairs . . . . . 31. **E. baissunensis** M. Pop.
- + Radical leaves broadly elliptic or ovate-elliptic. . . . . 20.
20. Radical leaves 17–19 cm long and 6–7 cm broad; bracts 8–10 mm long; calyx lanate-villous below with multiarticulate branched hairs . . . . . 29. **E. jakkabaghi** M. Pop.
- + Radical leaves 7–11 cm long and 2–3 cm broad; bracts 9–14 mm long; calyx covered beneath with glandular multiarticulate hairs . . . . . 30. **E. glanduligera** M. Pop.
21. Leaves green, simple or lyrate-pinnatipartite, large, subglabrous . . . . . 22.
- + Leaves pinnatipartite, often bipinnatipartite . . . . . 23.
22. Calyx 18–20 mm long, with short ovate-triangular teeth; lower lip with broad ovate middle lobe; appendages of all filaments alike, oblong, narrow, fringed; corolla white or ochroleucous, 40 mm long . . . . . 26. **E. cephalariifolia** M. Pop.
- 5 + Calyx 20–25 mm long, the teeth truncate, the rigid subulate point arising from apical notch; appendages of upper filaments broadly lamellate, fringed, those of lower filaments narrow, fringed; corolla yellow, 40–45 mm long . . . . . 28. **E. seravschanica** Rgl.
23. Radical leaves bipinnatipartite, the lateral lobes on one side with long petiolules, glabrous on both sides; calyx with broadly rounded teeth . . . . . 24. **E. czuiliensis** Golosk.

- + Radical leaves lyrate-pinnatipartite, the segments toothed, the lateral lobes sessile, hairy on both sides . . . . . 24.
- 24. Calyx teeth broadly truncate, short-pointed, with small ovate auricles on either side . . . . . 27. *E. schugnanica* (M. Pop.) Knorr.
- + Calyx tubular-campanulate, 15–20 mm long, the short triangular teeth without auricles . . . . . 25.
- 25. Radical leaves bipinnatisect or pinnatipartite, rarely lyrate, with oblong or ovate-oblong segments; leaves hairy only beneath . . . . . 23. *E. speciosa* Rupr.
- + Radical leaves pinnatisect, with sessile segments, the upper side with articulate hairs only on veins, with inequidradial stellate and glandular hairs; calyx tubular, 24–26 mm long, with broadly triangular teeth . . . . . 25. *E. dschambulensis* Knorr.
- 26(13). Robust plants; leaves large, lyrate-pinnatipartite or, if simple, then the upper lip hairless at margin inside and nutlets glabrous . . . . . 32.
- + All leaves simple . . . . . 27.
- 27. Leaves 6–15 cm long, broadly ovate with cordate base; large plants . . . . . 29.
- + Leaves 2.5–5 cm long and 2–3 cm broad, ovate, mostly cuneate at base . . . . . 28.
- 28. Upper lip of corolla white, the lower yellow; appendages of upper filaments lamellate-calcariform; calyx teeth shortly triangular, auriculate . . . . . 9. *E. ebracteolata* M. Pop.
- + Upper lip of corolla purple, the lower white with brown base; appendages of upper filaments scalelike, those of lower filaments spur-shaped . . . . . 10. *E. angreni* M. Pop.
- 6 29. Radical leaves broadly ovate, 6–15 cm long, crenate-lobate or coarsely lobate, glabrate, coriaceous; corolla plain white; bracts foliaceous, oblong-lanceolate . . . . . 4. *E. Korovinii* M. Pop.
- + Radical leaves broadly ovate, 17–20 cm long, unevenly dentate, with scattered hairs; corolla bicolor; bracts linear-subulate . . . . . 30.
- 30. Upper lip of corolla yellow; lower lip yellowish-brown, its middle lobe broader than long, reniform or obcordate . . . . . 2. *E. arctifolia* M. Pop.
- + Upper lip of corolla white; lower lip yellowish-brown, its middle lobe broadly cordate, much broader than lateral lobes . . . . . 31.
- 31. Corolla 20–25 cm long; calyx teeth triangular, flanked with auricles; leaves grayish beneath with multiarticulate and stellate hairs . . . . . 1. *E. cordifolia* Rgl.
- + Corolla 35–40 mm long, the upper lip white, the lower bright yellow; calyx teeth short, broad, exauriculate; leaves covered beneath with sparse multiarticulate and monoradial\* hairs . . . . . 3. *E. fetisovii* Rgl.
- 32. Leaves very large, lyrate-pinnatipartite or, if simple, then nutlets glabrous; robust plants 70 to 160 cm long . . . . . 33.
- + Leaves pinnatisect or simple and dissected on same plant. . . . . 36.
- 33. Whorls consisting of a pair of long-peduncled 3–6-flowered semiverticels in the axils of upper leaves . . . . . 7. *E. albertii* Rgl.
- + Whorls of the usual type, consisting of a pair of semiverticels in the axils of upper leaves, sessile . . . . . 34.
- 34. Calyx hispid-villous; corolla red with yellow stripe, the upper lip glabrous at margin inside or with sparse hairs . . . . . 6. *E. hissarica* Rgl.

\* [This term is used to designate stellate hairs in which one of the rays is very much longer than the others (Translator).]

- + Calyx glabrous or villous; corolla purple, the upper lip densely bearded . . . . . 35.
- 35. Leaves large, lyrate-pinnatipartite; nutlets hairy at apex . . . 5. **E. lehmanniana** Bge.
- + Leaves simple, small; upper lip of corolla almost hairless at margin inside; nutlets glabrous . . . . . 8. **E. zenaidae** M. Pop.
- 36. Flowers sessile or short-pedicel . . . . . 37.
- + Flowers long-pedicel . . . . . 50.
- 37. Robust plants, 60–120 cm high; radical leaves 15–25 cm long, lyrate-pinnatipartite, the lower segments short-petiolulate, the upper sessile; corolla white, yellow or bicolor; bracts subulate or absent . . . . . 37. **E. kaufmanniana** Rgl.
- 7 + Plants less vigorous, to 50 cm high; leaves smaller . . . . . 38.
- 38. Leaves spatulate-pinnatipartite; whorls of inflorescence dense, many-flowered; bracts linear, more rarely subulate . . . . . 39.
- + Leaves simple, deeply lobed or lyrate-pinnate; bracts subulate; lower lip of corolla elongate, one-and-a-half times to twice as long as the upper . . . 36. **E. labiosa** Bge.
- 39. Bracts linear or lanceolate; corolla large . . . . . 40.
- + Bracts short, subulate or lacking . . . . . 43.
- 40. Leaves with obovate lobes; corolla pink, included in calyx; bracts one-fourth to one-third as long as calyx, densely villous . . . . . 22. **E. hajastanica** Sosn.
- + Leaves lyrate-dissected, pinnatipartite or pinnatisect, rarely simple; corolla bright yellow . . . . . 41.
- 41. Calyx tubular, 15–20 mm long, whitish-lanate . . . . . 20. **E. iberica** Visiani.
- + Calyx tubular-campanulate, 14–28 mm long, with sparser indument; corolla white or ochroleucous . . . . . 42.
- 42. Calyx 14–16 mm long, with scattered flat hairs, the teeth broadly triangular with spine 1–1.5 mm long; corolla white, the lower lip flabellately 3-lobed, the middle lobe obcordate, the lateral lobes oblong . . . . . 19. **E. laciniata** (L.) Bge.
- + Calyx 18–28 mm long, densely covered with multiarticulate and glandular hairs; corolla ochroleucous, the lateral lobes of lower lip much broader than the middle lobe . . . . . 21. **E. labiosiformis** (M. Pop.) Knorr.
- 43. Radical leaves simple, oblong or ovate; corolla 20–25 mm long . . . . . 44.
- + Radical leaves pinnatipartite or pinnatisect . . . . . 45.
- 44. Radical leaves ovate or lanceolate, 15–20 cm long and 3–7 cm broad, cuneate at base, with stellate hairs above and beneath; calyx teeth triangular or rounded; bracts subulate, 5–6 mm long . . . . . 11. **E. eriocalyx** Rgl.
- + Radical leaves 20 cm long and 8–9 cm broad, slightly truncate at base, with coarsely crenate margin, covered on both sides with stellate, branched and simple hairs; bracts absent; calyx glabrous . . . . . 13. **E. gypsacea** M. Pop.
- 8 45. Whorls 2-flowered; flowers often with short pedicels; calyx destitute of simple hairs; bracts absent . . . . . 12. **E. uniflora** Rgl.
- + Whorls 4–6 and 8-flowered; flowers sessile; bracts present . . . . . 46.
- 46. Calyx and leaves gray with stellate down and multiarticulate hairs . . . . . 47.
- + Calyx and leaves glabrous or sparsely arachnoid, at length glabrescent . . . . . 48.
- 47. Radical leaves almost pectinately pinnatisect, with decurrent linear lobes; petioles glabrous or slightly pubescent; calyx densely tomentose . . . . . 15. **E. pectinata** M. Pop.

- + Radical leaves pinnatisect or pinnatipartite with unequal lobes; petioles villous; calyx copiously covered with flexuous, glandular and stellate hairs . . . . . 14. *E. canescens* M. Pop.
- 48. Nutlets glabrous at apex; plants glabrous when young; bracts absent . . . . . 18. *E. nuda* Rgl.
- + Nutlets villous . . . . . 49.
- 49. Calyx slightly pubescent at first, becoming glabrous or nearly so, tubular, 11–13 mm long; leaves pinnatipartite, glabrous above, with fine hairs on the veins and at margin beneath . . . . . 16. *E. gymnocalyx* Schrenk.
- + Calyx densely white-lanate, 13–15 mm long; leaves pinnatisect, with scattered multiarticulate hairs on both sides . . . . . 17. *E. iliensis* Rgl.
- 50(36). Plants up to 2 m high; flowers on pedicels 1.5–2 mm long; upper lip of calyx glabrous at margin inside, one-third to half as long as the lower; radical leaves 55 cm long, pinnatisect at base . . . . . 40. *E. tadschikistanica* B. Fedtsch.
- + Plants 25–50 cm high; leaves coriaceous, pinnatisect, rarely almost entire . . . . . 51.
- 51. Radical leaves pinnatipartite, with oblong or linear lobes, glabrous beneath; flowers on pedicels 8–10 mm long; bracts linear, mucronate, 17 mm long; corolla pinkish-white . . . . . 38. *E. transoxana* Bge.
- + Radical leaves almost simple with unequal rounded teeth or pinnate; bracts entire, pubescent on both sides, 8–13 mm long; flowers on pedicels 2–3 cm long; corolla white? . . . . . 39. *E. paniculata* Rgl.

Section 1. **Phlomoides** Bge. in Mém. Acad. Sc. Pétersb. VII sér. XXI, 1 (1873)

78. — Calyx not expanded toward apex, tubular or tubular-campanulate, limbless, with erect teeth; root fibrous; rootlets thickened (though not in all species).

- 9 Series 1. *Cordatae* M. Pop. Monogr. 63. — Radical leaves large, cordate-ovate, simple; calyx covered mainly with eglandular jointed hairs, stellate and glandular hairs sometimes occurring; corolla white or with yellow lower lip; appendages of filaments longitudinal or transverse.

1. *E. cordifolia* Rgl. in Tr. Bot. sada IX (1886) 550; Popov, Monogr. 64. — Ic.: Regel', op. cit. Plate V, 7–8; Popov, op. cit. Fig. 5.

Perennial; rhizome long, stout, nodose; stems erect, solitary, 100 cm long, simple or branched, 4-angled, covered at base with scattered multiarticulate branched and glandular hairs; radical leaves broad-ovate, cordate at base, rounded at apex, 10–15 cm long and 8–10 cm broad, coarsely double-dentate, glabrous above, canescent beneath with flat multiarticulate, glandular and sparse stellate hairs; cauline leaves compound, relatively small, ascending; floral leaves ovate, cuneate at base, dentate or entire, the lower longer, the upper equaling or shorter than the whorls; petioles of radical leaves 15–17 cm long, covered with multiarticulate hairs, those of cauline leaves short and broad; inflorescence of 8–12 flowers; lower 5–7 whorls distant, the upper 3–4



approximate; bracts linear or linear-subulate, 10 mm long, closely appressed; calyx teeth triangular, 1.5–2 mm long, with lanceolate auricles, covered with 4- or 5-jointed and glandular hairs; corolla white, 20–25 mm long; upper lip densely pubescent outside, bearded at margin inside; lower lip yellow, with scattered hairs, the middle lobe broadly cordate, briefly emarginate, the lateral lobes narrower, broad-ovate; appendages of upper filaments oblong, shallowly incised; nutlets bearded at apex. April–July.

Mountain zone, on rocky slopes. — Centr. Asia: Pam.-Al. Endemic. Described from the Uzgen region. Type in Leningrad.

Note. Popov's monograph describes the appendages of filaments as being spurlike; they are, however, oblong in the type.

2. *E. arctifolia* M. Pop. in Sched. ad HFAM (1926) No. 212; Popov, Monogr. 65. — *Phlomis hissarica* Rgl. in Tr. Bot. sada IX (1886) 594. — Ic.: Popov, op. cit. 66.

Perennial, 75–130 cm high; stems stout, erect, simple or branching in inflorescence, covered in lower part with scattered 3–5-celled hairs, under florescence with denser  
10 indument also containing stellate and glandular hairs; radical leaves broad-ovate, cordate at base, rounded at apex, unevenly dentate, 17–20 cm long, 9–14 cm broad; cauline leaves compound, 13–16 cm long and 6–8 cm broad, the upper oblong-ovate; floral leaves similar, smaller, green above, covered with scattered short hairs, the prominent veins beneath more densely hairy; radical leaves with petiole 15–17 cm long; cauline leaves short-petioled, the floral sessile; inflorescence of 5–9 whorls with 8–10 sessile flowers; lower whorls widely distant, only the uppermost 2 or 3 approximate; bracts linear-subulate, 14 mm long, nearly twice the length of calyx tube, covered with 4- or 5-celled and glandular hairs; calyx tubular-campanulate, with multiarticulate and glandular hairs, the teeth briefly triangular or rounded, long-pointed, reclinate, 7–9 mm long including point; corolla yellow, 20–25 mm long, the tube included in calyx; upper lip equaling or slightly shorter than the lower, shallowly emarginate, densely bearded at margin inside; lower lip yellowish-brown, the middle lobe broader than long, reniform or obcordate, with undulate or unevenly toothed margin, the lateral lobes broad-ovate; filaments finely arachnoid, with longitudinal appendages; nutlets hairy at apex. May–July.

In the tree and scrub belt, among shrubs on gravelly soil, at altitudes of 1800–2000 m. — Centr. Asia: Pam.-Al. Endemic. Described from Gazimailik Mountains. Type in Leningrad.

3. *E. fetissovii* Rgl. in Tr. Bot. sada IX (1886) 547; Popov, Monogr. 66. — *Phlomis Alberti* Rgl. op. cit. 547. — Exs.: HFAM No. 212.

Perennial, 100–120 cm high; rhizome oblique, with fibrous roots; stems stout, 4-angled, slightly curved or upright, densely covered with multiarticulate hairs, in middle part with scattered hairs, under inflorescence with multiarticulate and glandular hairs; radical leaves ovate, obtusish, 10–20 cm long; cauline leaves compound, smaller, the upper ovate or cuneate, doubly dentate; floral leaves entire at base, coarsely toothed above, subsessile, shorter than whorls; upper leaf surface with scattered short hairs, the lower surface with prominent veins, densely covered with 3–4-celled hairs interspersed with sparse stellate hairs; inflorescence of 9–11 widely distant, 10–12-flowered

whorls; bracts linear-subulate, shorter than calyx tube, covered with articulate and glandular hairs; calyx 15–17 mm long, with indument as on bracts, the teeth short, broad, 11 short-mucronate, erect or reclinate; corolla white, 35–40 mm long; upper lip densely bearded at margin within, with scattered hairs outside; lower lip bright yellow, 10 mm long and 15 mm broad, the lateral lobes suborbicular-ovate, unequally toothed or undulate; stamens and style exserted; filaments arachnoid, the upper with pectinate-lamellate appendages, the lower unappendaged, angular; nutlets long-hairy at apex. June–August.

In the forest-steppe and forest belts, at altitudes of 1500–2000 m, on gravelly slopes. – Centr. Asia: T. Sh. Endemic. Described from Kirghiz Range. Type in Leningrad.

4. *E. korovinii* M. Pop. Monogr. (1940) 67.

Perennial; root stout, dark red; stem 40–50 cm long, stout, obtusely 4-angled, branched in upper part only, covered with scattered crisp flattened hairs, slightly lanate under the nodes, with glandular hairs under inflorescence; radical leaves 6–15 cm long, broad-ovate, cordate at base, crenate-lobate or coarsely crenate, subcoriaceous; cauline leaves 1 or 2, resembling the radical but smaller; floral leaves ovate or oblong, finely toothed, shorter than whorls; petioles stout, sparsely covered with crisp and papillose hairs, those of radical leaves equaling the blade or to 20 cm long, the cauline short; whorls many-flowered, subremote or approximate, forming long broadly spicate inflorescences; bracts numerous, flat, foliaceous, oblong-lanceolate, long-acuminate, densely glandular-hairy, two-thirds the length of calyx; calyx 18–20 mm long, villous with glandular and simple hairs, broadly tubular, the teeth broad, short-truncate or subovate, with point 3–5 mm long; corolla white, 35–40 mm long, with curved tube, slightly exserted; upper lip 15–18 mm long, densely long-villous outside, densely long-hairy at margin inside; lower lip longer, 20–25 mm broad, flabelliform, the middle lobe transversely ovate, larger and longer than the ovate lateral lobes, these finely toothed or undulate; filaments densely villous, the upper longer, enlarged under the throat into large oblong fimbriate appendages, these decurrent brushwise to a ring of hairs; lower filaments unappendaged; ring of hairs villous-squamate; lobes of stigma of equal length; nutlets long-bearded at apex. July.

Alpine belt, in meadows. – Centr. Asia: T. Sh. (W.). Endemic. Described from the Naryn region, near Ketmen'-Tyube. Type in Tashkent.

- 12 Series 2. *Rhodanthae* M. Pop. Monogr. 68. – Radical leaves large (very rarely small), pinnatipartite, rarely simple; indument consisting of stiff simple and glandular hairs or plants glabrous; flowers purple or red; appendages of filaments longitudinal.

5. *E. lehmanniana* Bge. in Mém. Acad. Sc. Pétersb. VII sér. XXI, I (1873) 81; Regel' in Tr. Bot. sada IX, 545; Boiss. Fl. or IV, 795; Popov, Monogr. 68. – *E. superba* Bge. in Lehm. Rel. Bot. 265, non Royle. – *E. Olgae* Rgl. in Tr. Bot. sada VI (1879) 380 and in Putesh. v Turkest. III, 18, 70. – Ic.: Regel' op. cit. IX, Plate IV, Fig. 10–12.

Perennial; root stout, long, fibrous; stems 70–130 cm long, coarse, 4-angled, branched toward summit, hairy (in var. *intermedia* Rgl. glabrous under inflorescence and branches, otherwise stems with short glandular and bristlelike hairs under inflorescence); radical leaves large, the lyrate-pinnatisect or lyrate-lobate segments irregular, the lateral segments of pinnatisect leaves on short petiolules, the terminal segments or lobes broad-ovate or broad-obovate, coarsely pinnatisect or sinuate-lobate, dentate; floral leaves oblong-lanceolate, 2 cm long and ca. 1 cm broad, remotely denticulate or entire, the lower longer, the upper equaling or shorter, rarely longer than the whorls; lower side of leaves prominently netted-veined, both sides subglabrous; radical leaves with petiole 15–35 cm long; floral leaves sessile; inflorescence long, spikelike, of 4–6 whorls with 6–14 sessile flowers; lower whorls distant, the upper approximate; bracts lanceolate, connate at base in 2's or 3's, 13–16 mm long, equaling or shorter than calyx; calyx tubular-campanulate, coriaceous, prominently nerved, 18–26 mm long, glabrous, rarely covered with long hairs (in var. *intermedia* Rgl. with simple and glandular hairs); calyx teeth briefly triangular, terminating in point 3–4 mm long; corolla purple, twice to three times as long as calyx, pubescent outside, the tube glabrous; upper lip equaling or slightly exceeding the lower, curved at apex, shallowly emarginate, densely long-bearded at margin inside; lower lip flabelliform, the middle lobe broadly cordate, emarginate, the lateral lobes broadly obovate; filaments pubescent with longitudinal appendages; appendages of upper filaments narrow, short-fimbriate, those of lower filaments broadly lamellate-fimbriate; stigma lobes unequal; ring of hairs in middle part of corolla tube; nutlets bearded at apex. July–August.

Subalpine and wood-and-scrub zones, among shrubs. — Centr. Asia: Pam.-Al. Endemic. Described from Karatau Mountains in the Zeravshan Range. Type in Leningrad.

- 13 6. *E. hissarica* Rgl. in Tr. Bot. sada IX (1886) 542; Popov, Monogr. 70. — Ic.: Regel' op. cit. IV, Fig. 45.

Perennial; root stout; root collar fibrous; stems 80–150 cm long, brown, erect, branched toward summit, glabrous; radical leaves 30–35 cm long, lyrate-pinnatisect, the lobes with uneven rounded teeth, the lower blades with 1 or 2 remote petiolulate lobes; cauline leaves compound; lower floral leaves narrowly oblong, unevenly toothed, the uppermost ovate-lanceolate, entire; upper side of leaves subglabrous, lower side profusely hairy mainly along the veins; petioles of radical leaves purple, 20–25 cm long, tomentose at base, covered above with branched and scattered glandular hairs; petioles of cauline leaves 20 cm long; floral leaves sessile; whorls of inflorescence 9 or 10, 8–10-flowered, the lower 2–3 distant, the others approximate; flowers pediceled; bracts ovate or lanceolate, 10–20 mm long, connate at base in 3's, covered with 2–3-celled and glandular hairs; calyx tubular-campanulate, 15–30 mm long, covered all over with multiarticulate and glandular hairs; teeth broadly triangular, subulate-pointed, 3–4 mm long including point; corolla red with a yellow stripe, one-and-a-half to twice as long as corolla; upper lip shallowly emarginate, narrow, curved at apex, with short hairs at margin within (sometimes almost hairless), covered outside with multiarticulate hairs; lower lip with broad-ovate middle lobe, the lateral lobes ovate, the tube glabrous; appendages of filaments fimbriate-incised; ring of hairs in corolla tube under the appendages; stigma with unequal lobes; nutlets densely long-bearded. June–July.



Mountains, among *Pistacia* trees and shrubs. — Centr. Asia: Pam.-Al. **Gen. distr.** Afghanistan. Described from Gissar Range, Khakimi. Type in Leningrad.

7. **E. alberti** Rgl. in Tr. Bot. sada IX (1886) 557; Popov, Monogr. 71.

14 Perennial; roots long, with tuberous swellings; stems 100–180 cm long, erect, 4-angled, coarse, branched under inflorescence, glabrous; root collar tomentose; radical leaves lyrate-pinnatisect, 20–22 cm long and 15–16 cm broad, the lateral segments ovate-lanceolate or oblong, with uneven obtusish teeth, the lower tapering toward base; upper cauline leaves similar but smaller; floral leaves 10–15 mm long, ovate, entire or with 1 or 2 teeth near apex, much shorter than the whorls; petioles of radical leaves 15–16 cm long, covered with long hairs, those of cauline leaves 9 cm long; whorls of inflorescence 8 or 9, very distant, composed of two 3–6-flowered semiverticels, on peduncles 10–12 mm long; bracts 6–9 mm long, ovate-lanceolate, connate at base in 2's or 3's, covered with articulate and glandular hairs, one-third to half the length of calyx; calyx tubular-campanulate, densely covered up to the teeth with 2–3-jointed and glandular hairs, the teeth with scattered hairs, briefly and broadly triangular, the point arising from a notch in the tooth 1.5–2 mm long; corolla purple; upper lip 2-toothed at apex, rather sparsely bearded at margin inside, narrow, curved, exceeding lower lip; lower lip flabelliform, the middle lobe broadly reniform, the lateral lobes ovate-oblong; corolla tube glabrous; filaments pubescent, the appendages elongate, pectinate; ring of hairs in corolla tube under the appendages; nutlets long-bearded at apex. May–July.

Mountains, on gravelly slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Bal'dzhuan region. Type in Leningrad.

8. **E. zenaidae** M. Pop. Monogr. (1940) 71.

14 Perennial, 40–60 cm high; root with tuberous swellings; stems 2, simple, 4-angled, purple; radical leaves oblong-ovate, 10 cm long and 4–6 cm broad, unevenly toothed; cauline leaves narrower; lower floral leaves ovate-rhomboid, entire, the upper much shorter than the whorls; upper side of leaves glabrous, the lower side with prominent white veins, these covered with hairs or hairless; petioles of radical leaves 4–6 cm long, those of cauline leaves 7–8 mm; floral leaves sessile; whorls of inflorescence 8–10-flowered, peduncled, the lower distant, the upper approximate, forming a spikelike inflorescence; bracts ovate-lanceolate, glabrous, 8–10 mm long, connate at base in 3's, half as long as calyx; calyx glabrous, prominently nerved, 16–18 mm long, the rounded teeth short-subulate at apex; corolla purple, pubescent outside; upper lip slightly curved, glabrous or sparsely ciliolate at margin inside; lower lip longer, the middle lobe greatly exceeding the lateral lobes, emarginate, with semiorbicular lobules, the lateral lobes broad-ovate; upper filaments with short longitudinal appendages, the lower unappendaged; lobes of stigma equal; ring of hairs in corolla tube rather thin; nutlets glabrous at apex. June. (Plate I, Fig. 2.)

17 Desert regions, on stony soils. — Centr. Asia: T.Sh. (W.). Endemic. Described from Ketmen Mountains. Type in Leningrad.



(15)



PLATE I. 1 — *Eremostachys angreni* M. Pop., general aspect, calyx, corolla, nutlet; 2 — *E. naidae* M. Pop., general aspect, calyx, corolla, nutlet.

Series 3. *Integrifoliae* M. Pop. Monogr. 74. — Radical leaves small, simple, ovate, glabrous above; bracts rudimentary; filaments with transverse spurlike appendages.

9. *E. ebracteolata* M. Pop. Monogr. 75.

Perennial; root fibrous, with tuberous swellings; stem erect, simple, 20–30 cm long, with scattered simple and glandular hairs; radical leaves ovate, cuneate at base, 3–3.5 cm long and 18–20 mm broad; cauline leaves compound; lower floral leaves longer, the upper shorter than the whorls; upper side of leaves glabrous, alveolate, the lower side with prominent veins sparsely covered with 2-celled and glandular hairs; petioles of radical leaves 10–16 mm long, those of cauline leaves dilated, 1 cm long; floral leaves sessile; whorls of inflorescence distant, 6-flowered; bracts rudimentary, curved, pubescent, one-third the length of calyx tube; calyx tubular, prominently nerved, 10 mm long, the nerves covered with multicellular and glandular hairs interspersed with long spreading hairs; calyx teeth triangular, 1.5–2 mm long including spine, with ovate or rounded auricles; corolla rather small, exserted; upper lip white, curved, covered outside with long hairs, densely bearded at margin inside; lower lip yellow, the middle lobe obreniform, the lateral lobes oblong; tube glabrous from base to the middle; appendages of upper filaments lamellate-calcariform, those of lower filaments scalelike; ring of hairs in corolla tube under the appendages; nutlets long-bearded at apex. August.

Mountains, at altitudes of 1500 to 2000 m, on gravelly and rocky slopes. — Centr. Asia: T.Sh. (W.). Endemic. Described from Ugam river valley. Type in Leningrad.

10. *E. angreni* M. Pop. Monogr. (1940) 75.

Perennial, 20–60 cm high; fibrous roots fusiform; stems simple, erect, glabrous, brown or purple, pubescent under inflorescence; radical leaves ovate, rounded at apex, cuneate or cordate at base, 2–5 cm long and 2–3 cm broad, the margin with large rounded teeth; upper cauline leaves smaller, compound, sparingly toothed; floral leaves entire, shorter than the whorls; leaves glabrous on both sides; radical leaves with petioles 3–4 cm long; cauline leaves sessile; bracts rudimentary, caducous, one-fourth to one-third the length of calyx; calyx tubular-campanulate, 7–11 mm long, prominently nerved at the base of teeth, covered with fine simple appressed hairs; calyx teeth broadly triangular, 1.5–2 mm long, with reclinate subulate point from apical notch; corolla small, the tube included; upper lip purple, pubescent outside, bearded at margin inside; lower lip flabelliform, white or lilac, the middle lobe broadly cordate, with a dark yellow blotch at base, white chartaceous above, the lateral lobes broadly oblong, white; filaments and style pubescent; appendages of upper filaments scalelike, confluent with the ring of hairs, those of lower filaments spurlike; nutlets densely long-bearded at apex. July. (Plate I, Figure 1.)

Forest zone, on gravelly slopes, in juniper woods and among shrubs. — Centr. Asia: T.Sh. (W.). Endemic. Described from Angren. Type in Leningrad.

Series 4. *Gymnocalyces* M. Pop. Monogr. (1940) 77. — Radical leaves oblong or ovate, simple or pinnatifid; whorls many- or 2-flowered; bracts short, subulate, or absent; calyx tubular-campanulate, limbless, with short erect truncate teeth.

11. *E. ericalyx* Rgl. in Tr. Bot. sada IX (1886) 564; Popov, Monogr. 77. — Ic.: Regel', op. cit. Plate IX, Fig. 1—3.

Perennial, 20–55 cm high; roots stout; stems simple or branched nearly from base, the branches ascending, covered with numerous glandular and few stellate hairs; radical leaves ovate or rounded-oblong, cuneate or rounded at base, 15–20 cm long and 3–7 cm broad, simple, unevenly toothed and, if lobed, then lobes reaching one-third of blade width, toothed toward apex; lower cauline leaves 8–15 cm long and 3–8 cm broad, ovate, with uneven rounded teeth, the upper smaller; lower floral leaves enlarged upwards, oblong-ovate or ovate, entire or toothed toward apex, equaling or exceeding the whorls; both sides of leaves covered with stellate hairs (these with unequal rays or with one longer ray) interspersed with glandular hairs; petioles of lower cauline leaves 1–4 cm long, broad, winged at base; upper cauline leaves sessile, densely pubescent at base; inflorescence of 5 subapproximate 4–8-flowered whorls; bracts subulate, 5–6 mm long, sometimes rudimentary, curved; calyx tubular-campanulate; prominently  
19 nerved, 10–12 mm long; calyx teeth triangular or rounded-triangular, reclinate at apex, with spine 2–3 mm long; calyx and bracts densely covered with simple stellate and glandular hairs; corolla white, with glabrous tube; upper lip long-haired outside, very narrow, slightly curved at apex, densely bearded at margin inside; lower lip equaling or exceeding the upper, the middle lobe broad-cordate, the lateral lobes shorter, oblong-ovate, with finely toothed margin; filaments pubescent, the upper with longitudinal fimbriate appendages, the lower unappendaged; lobes of stigma unequal; ring of hairs in calyx tube squamate, at base of appendages. April–June.

Low foothills, in grassy steppes. — Centr. Asia: Syr-Dar., T. Sh. (W.), Pam.-Al. Endemic. Described from Dzhizak region (between Dzhizak and Yany-Kurgan). Type in Leningrad.

Note. Geographically distinct varieties occur:

var. *taschkentica* M. Pop. op. cit. — Leaves narrow, long, strongly rugose; stem and calyx with simple hairs in addition to stellate or else tomentose. — West T. Sh., Karatau.

var. *dshizakensis* M. Pop. op. cit. — Leaves broader, less rugose, hoary with stellate hairs or covered with simple hairs only; verticillasters numerous, distant, 4–6-flowered, the upper sometimes 2-flowered. — West Pam.-Al.

12. *E. uniflora* Rgl. in Tr. Bot. sada IX, 2 (1886) 558; Popov Monogr. 79. — Ic.: Regel' op. cit. Plate VII, Fig. 1.

Perennial; roots rather slender; root collar not tomentose-lanate; stems 4-angled, brown, covered with monoradial hairs (the elongated ray 5 times as long as the others), branched nearly from base, the branches ascending; radical leaves oblong, with uneven rounded teeth, 8–9 cm long and 2–3.5 cm broad; cauline leaves compound; floral leaves broad-ovate or obovate, entire, obtusish, the uppermost lanceolate, shorter than the whorls; petioles of radical leaves 2–4 cm long, those of cauline leaves short, dilated; floral leaves sessile; upper side of leaves covered with monoradial, multiarticulate and glandular hairs, the lower side with similar, more copious indument; inflorescence of 6–10 approximate 1- or 2-flowered whorls; flowers sessile or short-pedicelled; bracts linear or setiform, often rudimentary, one-third to half the length of calyx or absent; calyx



13–18 mm long, prominently nerved, densely covered with inequiradial stellate, glandular and multicellular hairs; calyx teeth short-triangular, 1–1.5 mm long, terminating in a reclinate spine ca. 2 mm long; corolla yellow; upper lip exceeding the lower, slightly curved at apex, pubescent outside, bearded at margin inside; lower lip flabelliform, the middle lobe cordate or rounded, with chartaceous undulate margin, the lateral lobes ovate; filaments densely pubescent, with longitudinal fimbriate appendages; ring of hairs in corolla tube squamate, under appendages of filaments; nutlets hairy at apex. April–May.

Plains. — Centr. Asia: Kyz.-Kum., Pam.-Al. Described from Zeravshan valley, between the mountains Kermine and Pokhistan. Type in Leningrad.

13. *E. gypsacea* M. Pop. Monogr. (1940) 79.

Perennial; stems sturdy, to 1 m long, obtusely 4-angled, stout, glabrous, divaricately branching in inflorescence or above the middle, the branches ascending, violet, glabrous except for white hairs under the whorls; radical leaves simple, 20 cm long and 8–9 cm broad, slightly truncate at base, coarsely crenate, sometimes almost lobate; cauline leaves 1 or 2 pairs, broadly elliptic, 2–4 cm long and 1.5–3 cm broad, the upper sharply dentate; both leaf sides with scattered stellate branched and simple hairs; petioles of radical leaves long, canaliculate, slightly lanate at base; cauline leaves short-petioled or subsessile; whorls of inflorescence 6-flowered, the flowers sessile; bracts rudimentary, filiform, or absent; calyx tubular-campanulate, glabrous or covered with scattered short hairs, green, prickly at apex or almost toothless or with broad truncate teeth, these produced into spine 2 mm long; corolla white, 25–30 mm long, 13 mm long, with narrow tube, falcately arched, tomentulose outside, long-bearded at margin inside; lower lip 15 mm long, flabelliform, the middle lobe obcordate, the lateral lobes ovate; all filaments with short pectinate-fimbriate appendages; ring of hairs close to appendages, consisting of a broad lower scale and small upper scales; nutlets with dense long hairs. May.

On gypsiferous red sandstone. — Centr. Asia: Pam.-Al. Endemic. Described from Guzar. Type in Tashkent.

14. *E. canescens* M. Pop. Monogr. (1940) 80.

Perennial; root stout; root collar tomentose; stems erect, simple, 30–60 cm long, covered with numerous glandular and monoradial hairs; radical leaves pinnatilobate, the lower segments decurrent, sessile, the lobes ovate or linear, with uneven obtuse or rounded teeth; cauline leaves similar, smaller, less divided; floral leaves obtusely short-lobate, round-toothed or entire, exceeding the whorls, the uppermost shorter than the whorls; petioles of radical leaves 3–5 cm long, covered with numerous glandular and monoradial hairs; cauline leaves short-petioled or sessile; all leaves hoary on both sides, covered with multiarticulate and branched hairs, less copiously on upper side; inflorescence of 5 or 6 whorls, these 4–8-flowered; bracts subulate, slightly curved, two-fifths to half the length of calyx; calyx subcampanulate, 10–12 mm long, profusely hairy, the hairs flexuous glandular and monoradial; calyx teeth broadly rounded-triangular or notched-triangular, 1.5–2 mm long, terminating in spine 0.5 mm long; corolla white; upper lip equaling or shorter than the lower, pubescent outside, bearded at margin inside; lower lip pubescent outside, the middle lobe broadly cordate, the lateral lobes



broadly rounded; filaments pubescent, with unevenly long-fimbriate appendages; ring of hairs under the appendages; stigma with unequal lobes; nutlets densely hairy at apex. April–May.

Mountains, on gravelly soils. — Centr. Asia: Pam.-Al. Endemic. Described from the foothills of Alai Range. Type in Leningrad.

15. *E. pectinata* M. Pop. Monogr. (1940) 81.

Perennial, 30–35 cm high; roots rather slender; root collar not tomentose; stems erect, simple, relatively slender, brownish-purple, covered with fine soft hairs; indument more copious under the whorls, composed of flat multiarticulate and glandular hairs; radical leaves rather few, pinnatisect, with decurrent linear lobes; cauline leaves ascending, unevenly pinnatisect with linear toothed lobes; floral leaves oblong-ovate, entire, sparingly short-toothed at apex, the lower exceeding, the upper as long as the whorls; petioles of radical leaves 1.5–2 cm long, subglabrous, those of cauline leaves short, broad, winged, densely covered with multiarticulate simple and flat hairs; floral leaves sessile; inflorescence of 4–6 distant 6-flowered whorls, the flower sessile; bracts lanceolate to oblong-lanceolate, 9–10 mm long, half to three-fourths the length of calyx, appressed to calyx, densely covered with fine multiarticulate flexuous hairs; calyx 10–12 mm long, densely tomentose with appressed multiarticulate, glandular and sparse stellate hairs, the short broadly triangular teeth 1 mm long, terminating in spine 0.5–1.5 mm long; corolla white; upper lip equaling or slightly shorter than the lower, long-haired outside, bearded at margin inside; lower lip with scattered hairs outside, the middle lobe cordate-reniform, the lateral lobes broad-ovate; corolla tube glabrous; filaments pubescent, with unevenly fimbriate longitudinal appendages; ring of hairs in corolla tube under the appendages; stigma with unequal lobes; nutlets long-haired at apex. May.

Mountains. — Centr. Asia: T. Sh. (W.). Endemic. Described from Karatau Mountains. Type in Leningrad.

16. *E. gymnocalyx* Schrenk, Enum. pl. nov. I (1841) 34; Benth. in DC. Prodr. XII, 548; Bge. in Mém. Acad. Sc. Pétersb. VII sér. XXI, 1, 80; Regel' in Tr. Bot. sada, VI, 373 and IX, 540; Popov, Monogr. 81. — Ic.: Regel' op. cit. IX, Plate I, Fig. 11.

Perennial, 60–80 cm high; root stout, fusiform, fibrous; root collar tomentose; stems 1 or 2, subglabrous, erect, simple, obtusely 4-angled; radical leaves numerous, pinnatipartite, the segments narrow, lanceolate or linear, pinnatilobed or toothed; cauline leaves compound, uni- or bipartite, the segments toothed; upper floral leaves ovate, almost entire or toothed, equaling or shorter than the whorls; all leaves glabrous above, fine-haired beneath on the veins and along the margin; petioles of radical leaves long, dilated, fulcrate; cauline leaves short-petioled; floral leaves sessile; inflorescence branching, of 8–10 distant 8–10-flowered whorls, the flowers sessile; bracts filiform or acicular, one-fourth to half the length of calyx; calyx tubular, 11–13 mm long, glabrous or sparsely pubescent, the triangular teeth 1–2 cm long, with spine 1–1.5 mm long; corolla white, 20 mm long, pubescent outside; upper lip longer the lower, bearded at margin inside; lower lip flabelliform, the middle lobe broadly reniform, with chartaceous margin, the lateral lobes broad-elliptic; tube glabrous outside; filaments pubescent, the

longitudinal appendages elongated, not reaching the ring of hairs; lobes of stigma subequal; nutlets short-haired at apex. May–June.

Foothills, in *Artemisia* and *Ferula* associations. — Centr. Asia: Balkh. Endemic. Described from the Lake Balkhash area, Kukurum (Kuke-Tau), between Arganaty Mountains and Lake Balkhash. Type in Leningrad.

17. *E. iliensis* Rgl. in Tr. Bot. sada VI (1879) 375 and IX (1886) 539; Popov, Monogr. 82. — Ic.: Regel' op. cit. IX, Plate I, Fig. 8–10.

Perennial, 60 cm high; roots rather slender, fibrous; root collar softly tomentose; stem erect or slightly curved, brownish-purple, covered with multiarticulate and sparse glandular hairs; radical leaves numerous, 10–12 cm long, pinnatipartite, the segments lanceolate or linear, irregularly and sharply pinnatifid, rarely simple; cauline leaves 1 or 2, resembling the radical, less deeply dissected; floral leaves oblong or ovate, unevenly toothed or unevenly lobate, ascending, equaling or exceeding the whorls, the uppermost entire or toothed only at apex, shorter than the whorls, with scattered fine multiarticulate hairs on both sides; petioles covered with multiarticulate hairs, these of radical leaves 2–4 cm long; cauline leaves short-petioled or sessile; verticillasters 2–4, very distant, approximate at summit, 4–8-flowered, forming a spikelike terminal inflorescence; bracts filiform or linear, one-third to half the length of calyx, covered with multiarticulate and glandular hairs; calyx tubular-campanulate, 13–15 mm long, white-tomentose, the teeth ovate-triangular or rounded-triangular, subulate-pointed; corolla white; upper lip curved, densely hairy outside, densely bearded at margin inside, as long as or slightly shorter than the lower; lower lip pubescent outside only at the middle, the middle lobe broadly elliptic, the lateral lobes broadly rounded, equaling the middle lobe; tube glabrous; upper filaments with short briefly fimbriate appendages, the lower filaments unappendaged; ring of hairs in tube under the appendages, composed of scales; nutlets long-haired at apex. May–June.

Central Asia: Balkh. Endemic. Described from Lake Balkhash area (Kuiankuz). Type in Leningrad.

18. *E. nuda* Rgl. in Tr. Bot. sada IX (1886) 540; Popov, Monogr. 82. — Ic.: Regel' op. cit. Plate III.

Perennial, 40–90 cm high; root stout, squamate; root collar often white-tomentose; stems 1 or 2, erect, simple, glabrous, in f. *pinnatifida* M. Pop. branching at summit; radical leaves 10–12 cm long and 5–6 cm broad, pinnatipartite (in f. *simplex* M. Pop. pinnatifid), at base less deeply incised, with obtusish toothed lobes, coriaceous, prominently white-veined; cauline leaves resembling the radical, with narrower segments; lower floral leaves pinnatilobate or toothed, longer than the whorls, the uppermost equaling or exceeding the whorls, ovate, almost entire, glabrous on both sides; petioles of radical leaves dilated, 3–5 cm long, ascending; cauline leaves sessile or short-petioled; inflorescence of 8–10 whorls, these 6-flowered, the lower distant, the upper approximate, forming a spikelike inflorescence; bracts absent; calyx coriaceous-membranous, tubular-campanulate, glabrous, the broadly triangular teeth 1–1.5 mm long, the throat bordered within with scattered hairs; corolla white; upper lip exceeding the lower, nearly straight or slightly curved, densely hairy outside, densely long-bearded at margin

inside, lower lip yellow, the middle lobe broadly rounded, emarginate, the lateral lobes short, narrow; corolla tube glabrous outside; upper filaments with longitudinal fimbriate appendages; lower filaments unappendaged; ring of hairs at base of the appendages; stigma with equal lobes; nutlets glabrous at apex. May–July.

Low and high foothills, in the grass and forb belt, in stony and gravelly places. — Centr. Asia: T. Sh. (W.), Pam.-Al. Described from Uzgen region (River Yassy). Type in Leningrad.

Series 5. *Laciniatae* M. Pop. Monogr. 85. — Plants of medium height; leaves spatulate-pinnatipartite; inflorescence of dense many-flowered whorls; bracts linear or lanceolate, rarely subulate; corolla yellow or white, 3.5–4 cm long, in some species smaller; appendages of filaments longitudinal; ring of hairs under the appendages.

19. *E. laciniata* (L.) Bge. in Ldb. Fl. alt. II (1830) 416; Ldb. Fl. Ross. III, 439; Benth. Lab. Gen. et sp. 636 et in DC. Prodr. XII, 547; Bge. in Mém. Acad. Sc. Pétersb. VII sér. XXI, 78 et in clave p. 80; Boiss. Fl. or. IV, 793; Popov, Monogr. 85; Grossg. Opred. rast. Kavk. 333. — *Phlomis laciniata* L. Sp. pl. ed. 2 (1762) 819, ed. 3. Willd. III (1800) 120; Aiton, Hortus Kewen. vol. III, 480; Pers. Synops. 2, 126; Sweet, Brit. flow. Garden (1823–1825) sér. 1, tab. 1, 24. — *E. Tournefortii* Jaub. et Spach, Illustr. pl. or. V (1853–1857) 12–13, tab. 412; Boiss. l. c. 793; Bge. l. c. 80. — *E. macrochila* Jaub. et Spach, l. c. — *E. sanguinea* Jaub. et Spach, l. c. — *E. Nerimani* Stapf, Ergebn. d. Polak. Exped. nach Persien (1882) 50. — *lc.*: Jaub. et Spach, l. c.

Perennial, 30–65 cm high; root collar white-lanate; stems erect or slightly curved, covered with scattered flat long and sparse glandular hairs; radical leaves pinnatipartite or deeply dissected, the lobes oblong, lanceolate or orbicular, toothed; lower segments petiolulate, the uppermost confluent with midrib, 10–20 cm long; cauline leaves resembling the radical but smaller; upper floral leaves oblong-elliptic or oblong, often entire, toothed at apex; both leaf sides glabrous; petioles covered with flat simple, multiarticulate and glandular hairs, those of radical leaves 8–16 cm long; cauline leaves short-petioled; floral leaves sessile; inflorescence a dense, oblong spikelike inflorescence; whorls many-flowered, the lower 2 or 3 remote, the others approximate; bracts lanceolate or linear-subulate, flat, 8–14 mm long, half to three-fourths the length of calyx, covered with long flat 4–5-jointed hairs; calyx tubular-campanulate, 14–16 mm long, with scattered flat hairs, the broadly triangular teeth terminating in a stout spine 1.5–2 mm long; corolla white, 20–25 mm long; shorter than the lower, straight, upper lip densely bearded at margin inside; lower lip flabelliform-trilobate, the middle lobe obcordate, the lateral lobes broadly oblong; appendages of upper filaments longitudinal, fimbriate, those of lower filaments toothlike, reaching the ring of hairs; nutlets densely bearded at apex. June.

Stony mountain slopes. — Caucasus: S. and E. Transc., Tal. **Gen. distr.:** Asia Minor, Iran. Described from cultivated specimens. Type in Linnaean Herbarium.



20. *E. iberica* Vis. Annot. ad Cat. sem. hort. Patavini (1846) et in Ann. Sc. Nat. sér. II, II (1847) 380; Jaub. et Spach, Illustr. pl. or. V, 12: Grossg. Opred. rast. Kav. 334. — *E. laciniata* ssp. *iberica* (Vis.) M. Pop. Monogr. (1940) 87. — Exs.: Herb. Fl. Cauc. No. 288 (pro *E. laciniata*).

Perennial, 50–100 cm high; roots fibrous; root collar white-lanate; stems erect, simple or branching, tough, more or less woolly with multiarticulate and flexuous hairs, in upper part with scattered hairs; radical leaves pinnatisect or pinnatifid (sometimes bipinnatifid) with 8–12 segments, these alternate, narrow, oblong or lanceolate, toothed, the lower petiolulate, the upper confluent with midrib; cauline leaves resembling the radical but smaller, the upper shorter than the whorls; petioles of radical leaves 8–12 cm long, those of cauline leaves short; upper leaf side green (in f. *glabri-folia* M. Pop. glabrous or nearly so), the lower side grayish with scattered multiarticulate and fine simple hairs; inflorescence of 8–10 many-flowered whorls, the lower whorls distant, the upper closely approximate and forming an oblong spike; bracts unequal, lanceolate or linear-subulate, appressed to and half to three-fourths the length of calyx, woolly with long multiarticulate and flat hairs overlying glandular hairs; calyx prominently nerved, tubular, 15–20 mm long, whitish-lanate; teeth broad, short-triangular, rigid, straight, spinescent; corolla bright yellow; upper lip straight, curved only at apex, densely bearded at margin within; lower lip with ovate-cordate middle lobe and broadly rounded lateral lobes; appendages of upper filaments thick, angular, fasciculate-  
26 fimbriate at base, those of lower filaments very briefly incised; ring of hairs in middle part of corolla tube; stigma with unequal lobes; nutlets densely short-bearded.  
April–July.

Dry gravelly slopes. — Caucasus: Dag., E. and S. Transc. **Gen. distr.:** Bal.-As. Min., Arm.-Kurd., Iran. Described from cultivated specimens. Type unknown.

21. *E. labiosiformis* (M. Pop.) Knorr. comb. n. — *E. laciniata* var. *labiosaeformis* M. Pop. Monogr. (1940) 87.

Perennial, 30–75 cm high; root collar lanate; stem erect, simple or in upper part branching, brownish-violet, glabrous or with scattered hairs, glandular-hairy only at nodes and under the inflorescence; basal leaves 8–19 cm long and 4–7 cm broad, tri-pinnatisect or pinnatifid, the segments oblong or ovate, sessile or short-petioluled, the terminal confluent with midrib (leaves variable, the segments ranging from very narrow to relatively wide); cauline leaves resembling the basal but smaller; floral leaves oblong, entire at base, unevenly toothed above, tapering toward apex; petioles of radical leaves 4–17 cm long, covered with multiarticulate and glandular hairs; cauline leaves short-petioled; floral leaves sessile; upper leaf side glabrous or with scattered branched and articulate hairs, the lower side with similar but denser indument interspersed with flexuous hairs; inflorescence long; lower whorls remote, the upper approximate, 8-flowered, the flowers sessile; bracts lanceolate or subulate, one-third to half the length of calyx, 10–12 mm long, covered with branched articulate and glandular hairs; calyx prominently nerved, 18–28 mm long, covered with multiarticulate (5 or more joints) and scattered glandular hairs; teeth broadly triangular, terminating in a point to 4 mm long; corolla 30–40 mm long, ochroleucous; upper lip shorter than the lower, curved, long-bearded at margin inside; lower lip with obcordate middle lobe, the much smaller



lateral lobes broad-ovate; appendages of upper filaments fimbriate, narrowed at base to a little fascicle, those of lower filaments short-toothed, at a distance of 3–4 mm from the ring of hairs; nutlets densely bearded. April–June.

Mountains, on slopes. — Centr. Asia: Mtn. Turkm. Endemic. Described from Turkmenia. Type in Leningrad.

22. *E. hajastanica* Sosn. in Grossg. Fl. Kavk. III (1932) 301 and Opred. rast. Kavk. (1949) 334; Popov, Monogr. 92.

- 27 Perennial, to 70 cm high; stems solitary, simple, more or less densely shaggy with papillose hairs; basal leaves sessile, spatulate-obovate, rather broad, with finely undulate margin, irregularly incised near apex; floral leaves sessile, oblong-obovate, with few teeth near apex, mucronate, the uppermost smaller; upper side of leaves with scattered long white papillose hairs, the lower side white-hairy mainly at angles; inflorescence many-flowered, with 10–20-flowered whorls; bracts linear-lanceolate, mucronate, one-third the length of calyx, rather densely villous; calyx to 17 mm long, campanulate-obconical, moderately covered with long hairs interspersed with shorter bristlelike as well as minute glandular hairs; calyx truncate at apex, with broadly triangular obtusish teeth, the nerves excurrent into erect spreading yellowish spines 2–3 mm long; corolla dry, pink (yellow according to Grossheim), the tube included in calyx, somewhat expanded in upper part; upper lip subfalcate, villous, especially at margin, with rather long white hairs; lower lip with unequal lobes, broader than long, the margin slightly erose; nutlets (immature) trigonous, obpyramidal, cinnamon-brown, villous at apex with rather dense short white hairs. May–July.

Lower mountain belt, on dry slopes. — Caucasus: S. Transc. Described from Evart. Type in Tbilisi.

Note. M.G. Popov points out in his study that this species is problematic and in need of further study. No material is available at the Komarov Botanical Institute of the Academy of Sciences of the U.S.S.R.

Series 6. *Speciosae* M. Pop. Monogr. (1940) 98. — Leaves large or medium-sized, pinnatipartite or pinnatisect, rarely simple; whorls many-flowered; calyx tubular or tubular-campanulate, with simple down or white-lanate, limbless, the teeth short, straight, truncate; corolla tube without a ring of hairs; appendages of filaments longitudinal.

23. *E. speciosa* Rupr. Sert. Tiansch. (1869) 68; Monogr. 99. — *E. laciniata* Rgl. in Tr. Bot. sada IX (1886) 552 pp., non Bge. — *E. transiliensis* Rgl. op. cit. 556. — Ic.: Popov, Plate 8.

- Perennial; roots fibrous, long, tuberous, the tubers often thickened, globose or elongate; stems erect, robust, 4-angled, 25–75 cm (mostly 20–50 cm) long, usually covered with fine long multiarticulate hairs; radical leaves bipinnatisect or pinnatipartite, more rarely lyrate, the segments oblong-lanceolate or ovate-oblong; floral leaves more or less pinnatifid, the lower longer, the upper as long as or shorter than the whorls (in var. *vulgaris* M. Pop. leaves pinnatifid), the segments pinnatilobate or toothed, subglabrous

above, gray beneath with multiarticulate flexuous and scattered stellate hairs; petioles of radical leaves 8–22 cm long, with indument as on stems; petioles of cauline leaves 2–7 cm long; flowers sessile in many-flowered whorls forming a compact oblong-ellipsoid spike or an elongate capitate inflorescence; bracts linear-lanceolate, equaling the calyx, densely covered with fine long spreading hairs; calyx tubular-campanulate, 15–26 mm long, white-lanate, the teeth short, triangular, spinescent; calyx and bracts covered with long hairs interspersed with glandular hairs; corolla 40–50 mm long, yellow; upper lip equaling the lower, bearded at margin inside; lower lip flabelliform-trilobate, with toothed or undulate margin; tube glabrate; filaments with longitudinal fimbriate appendages; ring of hairs absent or rudimentary; nutlets densely bearded at apex. April–August.

Stony slopes at altitudes of 600–2700 m. — Centr. Asia: Syr D., Pam.-Al., T. Sh., Mtn. Turkm. **Gen. distr.:** Iran, Ind.-Him. Described from Tien Shan, from Shamsi pass. Type in Leningrad.

The following varieties should be noted:

var. *bipinnatifida* (Rgl.) M. Pop. — *E. laciniata* var. *bipinnatifida* Rgl. in Tr. Bot. sada IX (1886) 555. — Leaves pubescent, pinnatisect, the segments ovate-oblong, deeply pinnatifid; stems to 40 cm long, the lower whorls distant. — In mid-mountain zone.

var. *subintegrifolia* M. Pop. — *E. transiliensis* Rgl. op. cit. — Leaves hairy on both sides, hoary, almost undivided, oblong or oblong-ovate, sometimes slightly lobed at base or lyrate. — W. Pam.-Al., Dzu. Alatau.

24. *E. czuiliensis* Golosk. in Bot. mart. gerb. Bot. inst. AN SSSR, XV (1953) 16. — **lc.:** op. cit. 17.

Perennial, 40–80 cm high; root collar white-tomentose; stems 4-angled, erect, more or less pubescent at base, more densely so at the angles, densely white-villous under inflorescence; radical leaves bipinnatifid, the lateral lobes on one side long-petioluled, dissected into linear or lanceolate toothed segments; cauline leaves simply pinnate, 29 smaller; floral leaves compound, reduced to broadly lanceolate, undivided, unevenly toothed near apex, sessile, as long as or shorter than calyx; leaves subglabrous beneath; petioles of radical leaves 4–12 cm long; cauline leaves short-petioled; inflorescence a long dense oblong spike; whorls 6–10-flowered, the lower distant; flowers sessile; bracts linear or lanceolate, 10–15 mm long, terminating in a spinous point 3 mm long, about half the length of calyx; calyx tubular, 20–25 mm long, slightly expanded toward apex, the teeth short, broad, rounded or triangular, terminating in a stout spine 1.5–2.5 mm long, densely covered in lower part with simple hairs; corolla golden-yellow, 30–45 mm long, the tube distally expanded, ca. 25 mm long; upper lip arched, densely bearded at margin inside; lower lip 15 mm long, the middle lobe reniform, the lateral lobes broad; filaments hairy in middle part, with papillose-fimbriate appendages at base; ring of hairs absent, a scale present at the base of the tube; nutlets dark brown, trigonous, long-villous at apex. June.

Stony slopes of coniform mountains. — Centr. Asia: T. Sh. Endemic. Described from Chu-Iliiskie Mountains. Type in Alma Ata; cotype in Leningrad

25. *E. dschambulensis* Knorr. in Addenda XX, 645.

Perennial, 30–40 cm high; root collar lanate; stems erect or slightly curved, simple below, branching in upper part, rather densely pubescent at base, only under inflorescence densely covered with 3–4-jointed and flat hairs; radical leaves 13–14 cm long and 6.5–7.5 cm broad, pinnatisect, the segments sessile, their lobes oblong or lanceolate, rounded or obtusish; lower floral leaves resembling the radical, 9 cm long and 2.5–3.5 cm broad, the upper oblong-elliptic, with large obtuse teeth or pinnatifid, glabrate above, with articulate hairs only on the veins, the lower side prominently veined, covered with inequilateral stellate and glandular hairs; petioles of radical leaves 4.5–7.5 cm long; lower floral leaves sessile; flowers sessile; whorls 8-flowered, approximate except for one distant whorl, forming an oblong-ellipsoid spike; bracts lanceolate to linear-lanceolate, spiny-pointed, 15–18 mm long, half to three-fourths the length of calyx covered with long fine multiarticulate spreading hairs and flat articulate hairs; calyx tubular, 22–24 mm long including teeth, covered with multiarticulate branched hairs, the teeth broadly triangular, terminating in a rigid spine; corolla ochroleucous (in dry condition); 30–35 mm long, upper lip with scattered hairs; lower lip glabrous except for sparse hairs at center, bearded at margin within, the middle lobe obcordate, the lateral lobes broad-ovate, shorter; tube glabrous, the ring of hairs rudimentary or absent; filaments with elongate fringed longitudinal appendages; nutlets densely short-bearded at apex. May–June.

Foothills, in grass steppes. — Centr. Asia: T.Sh. (W.). Endemic. Described from the Dzhambul region, Vysokoe. Type in Leningrad.

26. *E. cephalariifolia* M. Pop. Monogr. (1940) 102.

Perennial, 45–80 cm high; stems erect, sturdy, 4-angled, brownish-purple or whitish, glabrous or with scattered hairs, arachnoid-lanate at nodes; radical leaves lyrate-pinnatisect, the segments lanceolate, alternate, spreading, sessile, rarely with uneven obtusish teeth, the uppermost deeply sinuate-lobate with sinuate-lobulate lobes; cauline leaves 1 pair, resembling the radical; lower floral leaves long, pinnatisect, unevenly toothed, greatly exceeding the whorls, the upper ovate, entire, rarely toothed at apex, equaling or shorter than the whorls, glabrous above, prominently veined beneath, the veins beset with many-jointed and branched hairs; petioles of radical leaves dilated, glabrous or covered with multiarticulate hairs, 13–19 cm long; cauline leaves short-petioled or sessile; inflorescence composed of numerous closely approximate and 1 or 2 distant verticillasters, oblong-ellipsoid, spikelike or ovoid-capitate; bracts linear-lanceolate, rigid, 15–17 mm long, equaling or shorter than calyx, covered with multiarticulate branched and sparse glandular hairs (in *f. canescens* Knorr. calyx white-lanate with multiarticulate hairs); corolla white or stramineous, pubescent; upper lip shorter than the lower, densely bearded at margin inside; middle lobe of lower lip broadly elliptic, shallowly emarginate, unevenly toothed, the lateral lobes rounded-elliptic or broadly elliptic; all  
33 filaments with narrow longitudinal short-fimbriate appendages; ring of hairs absent; nutlets densely bearded at apex. May–July.

Gravelly slopes of the forest-steppe zone, in walnut and mixed broad-leaved woods. — Centr. Asia: T.Sh. Endemic. Described from Arslanbob. Type in Leningrad.

Note. Popov stated that this species is confined to walnut woods; it has been, however, later found in other areas of West Tien Shan. Specimens collected in the Alma



Ata area are also identical with *E. cephalariifolia* except the upper floral leaves that are mostly dissected and rarely ovate.

27. *E. schugnanica* (M. Pop.) Knorr. comb. n. — *E. speciosa* Rupr. var. *schugnanica* M. Pop. Monogr. (1940) 101.

Perennial, 10–25 cm high; root collar white-lanate; stems several, 4-angled, branching from base, rather densely pubescent; radical leaves lyrate-pinnatipartite, the segments toothed, 10–12 cm long and 4–6 cm broad, with petiole 7–10 cm long; upper leaves sessile; flowers numerous, sessile; lower 1 or 2 whorls remote, the others approximate, forming an oblong-ellipsoid spike; bracts lanceolate, 10–12 mm long, half the length of calyx, densely covered with long fine white spreading hairs; calyx 21–22 mm long, white-lanate, the teeth broadly truncate or notched, with point 1.5 mm long, flanked by small ovate auricles; corolla yellow, 40 mm long; upper lip shorter than the lower, almost straight, slightly curved at apex, bearded at margin within; lower lip 20–21 mm long and 16–17 mm broad, the middle lobe broad-ovate, short-toothed at apex, the lateral lobes broad-ovate, overlapping with middle lobe; all filaments with longitudinal fimbriate appendages, those of lower filaments narrower; tube without a ring of hairs; nutlets with apical tuft of hairs. May.

Rocky mountain slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Shugnan. Type in Leningrad.

28. *E. seravschanica* Rgl. in Tr. Bot. sada, IX (1886) 548; Popov, Monogr. 102. — Ic.: Regel', op. cit., Plate V, 1–4.

34 Perennial, 30–60 cm high; roots long, stout, straight; root collar lanate at base; stems erect, sturdy, obtusely 4-angled, glabrous or covered with multiarticulate and glandular hairs, with denser woolly indument under inflorescence and at nodes; radical leaves ovate-oblong, with rounded teeth or crenate, 6–15 cm long and 4–5 cm broad, cuneate or subcordate at base, subobtusely (leaves commonly undivided, round-toothed or slightly pinnatilobate; in f. *lyrata* M. Pop. deeply pinnatifid or pinnatipartite; in f. *subcanescens* M. Pop. undivided); cauline leaves compound, smaller; bracts equaling or exceeding the whorls, the upper broad-ovate or oblong-elliptic, toothed or lobate; petioles of radical leaves dilated, distally fulcrate, thickened, with multiarticulate and glandular hairs; cauline leaves subsessile or short-petioled; leaves glabrous on both sides, only on the veins beneath with simple or rarely stellate hairs (in f. *subcanescens* both sides covered with short simple hairs especially along the veins); whorls of inflorescence many-flowered, the 2 lowermost distant, the others closely approximate, forming an oblong or ellipsoid spike; flowers sessile; bracts 16–22 mm long, lanceolate or linear, point-tipped, half to three-fourths the length of calyx, covered with multiarticulate hairs; calyx tubular, 20–25 mm long, the teeth 2–3 mm long, truncate, with point from apical notch, rigid, subulate, sometimes with triangular auricles; corolla bright yellow, 40–45 mm long; upper lip slightly curved, pubescent outside, densely bearded at margin inside; middle lobe of lower lip transversely suboval, the lateral lobes rounded-ovate, as long as the middle lobe, with finely toothed margin; appendages of upper filaments broadly lamellate, those of lower filaments narrower, fimbriate; hairy ring





PLATE II. 1 — *Eremostachys pulchra* M. Pop., plant parts, corolla, calyx; 2 — *E. popovii* Gontsch., plant parts, corolla, calyx.

obsolescent, distant from the appendages; lobes of stigma unequal; nutlets densely bearded at apex. August–September.

Lower part of subalpine zone, on stony placers and moraines. — Centr. Asia: Pam.-Al. (W.). Endemic. Described from Mura pass. Type in Leningrad.

29. *E. jakkabaghi* M. Pop. Monogr. (1940) 103.

Perennial, 50–60 cm high; root long, stout; root collar slightly lanate; stems erect, with scattered pubescence from base to inflorescence, white-woolly under inflorescence with fine branched multiarticulate hairs; radical leaves elliptic, 17–19 cm long and 6–7 cm broad, cuneate or rounded at base, obtusish, the lower lobes rounded-crenate; lower floral leaves coarsely crenate or pinnatifid, oblong, acuminate, exceeding the whorls, the upper shorter than the whorls; petioles of radical leaves short, covered with multiarticulate hairs (8–10 joints); floral leaves sessile; leaves with scattered multiarticulate hairs mostly on veins, the lower side densely covered with branched and multiarticulate hairs interspersed with sparse stellate hairs; whorls 4–6-flowered, the lower subdistant, the others approximate, forming a spikelike inflorescence; flowers sessile; bracts flat, narrowly lanceolate, point tipped, 8–10 mm long, not rigid, half the length of calyx; calyx tubular, 20–25 mm long, densely pubescent, in lower part lanate-villous with multiarticulate and branched hairs, in upper part covered with simple and branched hairs, sometimes with short glandular hairs, the teeth short, broad, abruptly truncate, surmounted by spine 3–4 mm long; corolla yellow; upper lip narrow, shorter than the lower, covered outside with multiarticulate and glandular hairs, bearded at margin within; lower lip with broadly reniform-ovate toothed-margined middle lobe, the lateral lobes shorter, ovate; filaments with longitudinal broadly fimbriate appendages; ring of hairs completely absent. May–June.

Forest-steppe belt, among juniper woods. — Centr. Asia: Pam.-Al. Endemic. Described from Yakkabag. Type in Tashkent.

30. *E. glanduligera* M. Pop. Monogr. (1940) 103.

Perennial, 35 cm high; root collar lanate; stems simple, 4-angled, densely covered at base with flat multiarticulate and glandular hairs, glabrescent above; radical leaves elliptic, cuneate at base, rounded-obtuse at apex, 7–11 cm long and 2–3 cm broad, coarsely double-crenate to sublobate; cauline leaves similar but smaller; floral leaves shorter than the whorls; petioles of radical leaves short, covered with multiarticulate and glandular hairs; flowers sessile; whorls numerous, the lower remote, the upper closely approximate; bracts linear, 9–14 mm long, about half the length of calyx, covered with multiarticulate hairs; calyx 20 mm long, tubular-campanulate, densely covered at base with multiarticulate and glandular hairs, with scattered hairs above, the teeth short, rounded, obtuse, with spine 3–4 mm long; corolla yellow, 40 mm long; upper lip bearded at margin inside; middle lobe of lower lip broad-ovate, with unevenly toothed margin, the lateral rounded lobes about equaling the middle lobe; filaments with longitudinal short-fimbriate appendages; ring of hairs absent; nutlets with dense short hairs at apex. May–August.

Alpine and subalpine zones, at altitudes of 2600–3400 m, on stony and gritty slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Gissar range. Type in Leningrad.

31. *E. baissunensis* M. Pop. Monogr. (1940) 101.

36 Perennial, 30 cm high; stems simple, arachnoid-woolly, at length glabrescent; radical leaves narrowly oblong or elliptic, obtuse, evenly crenate-dentate; cauline leaves 1 pair; floral leaves oblong, exceeding the whorls; leaves hoary with stellate hairs; bracts linear, mucronate, half the length of calyx, the margin, like the lower part of calyx, softly white-pubescent; calyx 20 mm long, somewhat hoary in upper part with inequiradial\* hairs, the teeth short, broad, with spine 2–3 mm long; corolla as in *E. seravschanica*. May–July.

Centr. Asia: Pam.-Al. Endemic. Described from Chul'Bair Mountains. Type in Tashkent.

Note. This is likely to be a form *E. jakkabaghi* M. Pop.

Series 7. *Fulgentes* M. Pop. Monogr. (1940) 105. Radical leaves simple or very rarely pinnatifid at base with short lobes, stellate-hairy; calyx tubular, without limb, the teeth short, erect; corolla large, with exserted tube; appendages of filaments longitudinal; corolla tube without a ring of hairs.

32. *E. fulgens* Bge. in Mém. Acad. Sc. Pétersb. VII sér. XXI (1873) 80; Regel' in Tr. Bot. sada, IX, 536; Popov, Monogr. 105. — *E. Krauseanus* Rgl. op. cit. VI (1879) 378. — *Ic.*: Regel', op. cit. IX, Plate I.

Perennial, 30–35 cm high; stems erect, glabrous from base to leaf nodes or with scattered branched, multiarticulate, monoradial and glandular hairs; radical leaves oblong-elliptic, 8–20 cm long and 8–10 cm broad, cuneate or rounded at base, more or less dissected-lobate or deeply lobate, the lobes oblong-lanceolate or ovate, coarsely and doubly crenate-dentate; floral leaves ovate, slightly exceeding the whorls, the upper shorter than the whorls; upper side of leaves with scattered monoradial as well as multiarticulate and glandular hairs; indument on lower side similar but denser and without multiarticulate hairs; petioles of radical leaves 2–7 cm long, woolly with multiarticulate and monoradial hairs; cauline leaves sessile; whorls many-flowered, forming a compact spike; flowers sessile; bracts linear or subulate, 8–10 mm long, two-fifths the length of calyx, covered with monoradial hairs, the margin with multiarticulate hairs; calyx 17–18 mm long, tubular, expanded distally, covered from base to middle with branched inequiradial and glandular hairs, the teeth triangular-short-acuminate; corolla  
37 yellow, 35–40 mm long, twice the length of calyx, puberulent; upper lip falcately curved, with toothed margin, densely bearded inside; lower lip flabellately 3-lobed, the middle lobe obreniform, the lateral lobes broadly obovate; filaments with longitudinal fimbriate appendages; lobes of stigma of unequal length; ring of hairs in calyx tube rudimentary; nutlets hairy at apex. June–August.

Mountains, at altitudes of 1500–2000 m. — Centr. Asia: T.Sh. (W.). Gen. distr.: Iran. Described from Iran. Type in Paris.

\* [Denoting stellate hairs with unequal rays (Translator).]



33. *E. baldschuanica* Rgl. in Tr. Bot. sada, IX (1886) 541; Popov, Monogr. 106. — *E. Trautvetteriana* Rgl. op. cit. 551. — Ic.: Regel', op. cit. Plate IV, Fig. 1–3.

Perennial, 60–90 cm high; stems simple, suberect, glabrous or with scattered simple and multiarticulate hairs, more densely hairy under the nodes; radical leaves oblong-elliptic, 15–30 cm long and 10–12 cm broad, cuneate or rounded at base, coarsely short-lobate or pinnatilobate, the lobes crenate-dentate; cauline leaves compound, smaller; floral leaves ovate, undivided, exceeding the whorls, the uppermost shorter; upper side of leaves appressed-pubescent with scattered monoradial hairs, roughened beneath with similar indument but mainly along veins; petioles of radical leaves dilated at base, 6–13 cm long, ascending; cauline leaves short-petioled; floral leaves sessile; whorls many-flowered, forming a long spike; bracts lanceolate, rigid, short-acuminate, half the length of and appressed to calyx, covered with branched and glandular hairs; calyx tubular, 16–18 mm long, prominently nerved (in var. *trautvetteriana* M. Pop. *sulcate*), covered in lower half with branched and glandular hairs, in upper part also with stellate hairs; calyx teeth short, triangular, with spine 1–1.5 mm long; corolla yellow; upper lip slightly curved, pubescent outside, bidentate at apex, densely bearded at margin inside; lower lip with shallowly emarginate middle lobe and broadly rounded lateral lobes; appendages of filaments long, linear, fimbriate; nutlets long-haired at apex. May–June.

Mountains. — Centr. Asia: Pam.-Al. Endemic. Described from Bal'dzhuan. Type in Leningrad.

34. *E. popovii* Gontsch. in Tr. Tadzh. bazy AN SSSR, II (1936) 188; Popov, Monogr. 107. — *E. rigida* M. Pop. Monogr. (1940) 108, nom.

- 38 Perennial, 50–90 cm high; root collar glabrous; stems erect, simple, covered with scattered monoradial, thick multiarticulate and glandular hairs; radical leaves lyrate-pinnate, 18–21 cm long, the lateral leaflets sessile, oblong-elliptic or lanceolate, 6–8 cm long, unevenly dentate or erose-dentate, the terminal leaflet large; cauline leaves similar but smaller; lower floral leaves lanceolate, exceeding the whorls, the upper suborbicular, obelliptic or broadly lanceolate, sharply dentate or entire, about equaling the whorls; upper side of leaves bright green, covered with inequ radial stellate and glandular hairs, the lower side with similar but denser indument; petioles of radical leaves 8–17 cm long, dilated at base, covered with inequ radial hairs; cauline leaves short-petioled; floral leaves sessile; inflorescence spikelike; whorls of 10–14 sessile flowers, closely approximate, the lower distant; bracts lanceolate, rigid, the outer elliptic-lanceolate, 12–17 mm long, as long as or slightly shorter than calyx tube, covered with inequ radial, articulate and glandular hairs, more rarely subglabrous; calyx tubular, 16–20 mm long, slightly expanded upwards, prominently nerved, covered mainly on the nerves with unequ radial and glandular hairs, the teeth broad, acuminate; corolla bright yellow, 37–38 mm long; upper lip shorter than the lower, pubescent outside, slightly curved, bearded at margin inside; middle lobe of lower lip broadly reniform, shallowly emarginate, the lateral lobes broadly rounded; filaments with longitudinal lamellate-fimbriate appendages; corolla tube without a ring of hairs. May–July. (Plate II, Figure 2.)

Wood-and-scrub and subalpine zones, in grass and forb associations, on gritty soils. — Centr. Asia: Pam.-Al. Endemic. Described from Varzob. Type in Leningrad.



35. **E. pulchra** M. Pop. Monogr. (1940) 104.

Perennial, 30–80 cm high; root collar lanate; stems obtusely 4-angled, diffusely pubescent at base, glabrous above, only under the nodes with branched, articulate and glandular hairs; radical leaves simple, 7–15 cm long and 3.5–6 cm broad, elliptic, cuneate at base, dilated above, obtusely rounded, doubly crenate, or leaves pinnatilobate, the lobes unequal, elliptic, obtusish or unevenly toothed; cauline leaves elliptic, point-tipped; floral leaves oblong, the lower longer, the upper shorter than the whorls; upper side of leaves glabrous or sparsely pubescent, the lower side covered on veins and on the margin of teeth with articulate and few inequatorial and glandular hairs; petioles of radical leaves dilated, 5–8 cm long, ascending; cauline leaves short-petioled; floral leaves sessile; flowers in whorls, the lower 2–3 whorls distant, the others closely approximate, forming a spikelike inflorescence; bracts 8–9 mm long, subulate, appressed to calyx, covered with multiarticulate hairs (with 8 or 9 joints); calyx tubular, prominently nerved, 14–16 mm long, covered from base to middle with multiarticulate branched and glandular hairs, above with scattered similar indument intermixed with stellate hairs; calyx teeth short, triangular, with spine 1.5–2 mm long; corolla white, 35–38 mm long; upper lip bidentate, shorter than the lower, covered outside with long hairs, long-bearded at margin inside; lower lip with broadly reniform middle lobe, the lateral lobes rounded; tube glabrous, with a rudimentary ring of hairs; appendages of filaments not reaching the ring of hairs; lobes of stigma somewhat unequal. May. (Plate II, Figure 1.)

Mountains, on slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Kyzyl-Kiyak Mountains. Type in Leningrad.

Series 8. *Tuberosae* M. Pop. — Leaves simple, deeply lobate or lyrate-pinnate; calyx limbless, tubular, stellate-pubescent, with simple and glandular hairs, the teeth erect; lower lip of corolla about twice as long as the upper, the middle lobe exceeding the lateral lobes, the tube with a ring of hairs; appendages of filaments inconspicuous, papilliform.

36. **E. labiosa** Bge. in Mém. Acad. Sc. Pétersb. VII sér. XXI (1873) 679; Regel' in Tr. Bot. sada, IX, 534; Popov, Monogr. 109. — *E. discolor* Bge. l. c. — *E. diversifolia* Rgl. op. cit. VI (1879) 380. — *E. napuligera* Franch. in Ann. Sc. Nat. sér. VI, XVIII (1884) 237, tab. 17. — **lc.**: Regel', op. cit. Fig. 1–2.

Perennial, 20–60 cm high; roots tuberous; root collar lanate; stems 1 to several, simple, rarely branching above, covered with monoradial hairs with an elongated ray and often with multiarticulate glandular hairs; radical leaves oblong or ovate, with cuneate or rounded base, simple, deeply lobate or lyrate-pinnate, the lobes with rounded teeth; cauline leaves compound, smaller; floral leaves ovate or oblong-ovate, dentate, exceeding the whorls, the upper entire or short-toothed, shorter than the whorls; upper side of all leaves green, with scattered stellate, glandular and sparse simple hairs, the lower side with monoradial hairs, mostly on veins; petioles of radical leaves pubescent, 3.5–10 cm long; cauline leaves short-petioled; floral leaves sessile; whorls of inflorescence many-flowered, the lower subdistant, the upper approximate, forming a loose or

compact spikelike inflorescence; bracts linear-subulate, 6–8 mm long, one-fourth to half the length of calyx tube, covered with articulate and scattered glandular hairs (in var. *canescens* Rgl. bracts and calyx densely stellate-pubescent); calyx tubular-campulate, the teeth broadly triangular or rounded-triangular, with spine 1–3 mm long, rather densely covered with monoradial and capitate glandular hairs (in var. *subvillosa* Rgl. bracts and calyx with insignificant stellate and copious long hairs); corolla white or yellow, the tube slightly exserted; upper lip slightly curved, bearded at margin inside; lower lip nearly twice as long, the middle lobe elongated, obcordate, shallowly emarginate, the lateral lobes ovate, shorter than the middle lobe; ring of hairs present inside the tube; appendages of filaments rudimentary, papillose-calcariform; filaments pubescent in middle part; lobes of stigma unequal. April–May.

Foothills, on loess deposits. — Centr. Asia: Mtn. Turkm., Kara K., Syr D., Pam.-Al. and T.Sh. (W.). **Gen. distr.:** Iran. (Afghanistan). Described from N. Iran. Type in Leningrad.

Note. A species requiring further study in natural conditions. It is possible that it comprises a number of species connected with different geographic areas.

Series 9. *Lyratae* M. Pop. Monogr. (1940) 111. — Leaves lyrate-pinnatipartite, large; bracts subulate or absent; calyx limbless, stellate-pubescent or with sparse simple hairs, the teeth very short, truncate, terminating in a short spinescent point; appendages of filaments longitudinal, fimbriate; corolla tube with a ring of hairs.

37. *E. kaufmanniana* Rgl. in Tr. Bot. sada, VI (1879) 349; Popov, Monogr. 112. — *E. adpressa* Rgl. op. cit. IX (1886) 12.

Perennial, 60–120 cm high; stems obtusely 4-angled, divaricately branching in upper part, rarely simple, glabrous or with scattered long articulate hairs; radical leaves lyrate-pinnatifid, 15–25 cm long, the lower segments short-petioluled, not opposite, 3–4 pairs, 41 the upper sessile, oblong or oblong-lanceolate, unevenly lobate, with rounded teeth (or erose-crenate), the uppermost segments broadly spatulate; floral leaves simple, the lower equaling or slightly exceeding the calyx, the upper much shorter; petioles of radical leaves 6–12 cm long, covered with 2–4-jointed hairs; upper cauline leaves sessile; upper side of leaves green, glabrous or sparsely hairy, the veins on lower side with articulate hairs; flowers sessile; whorls 8–10, 6–10-flowered, remote, only the upper 2 or 3 approximate; bracts subulate, 4–5 mm long, spreading and partly appressed to calyx, with long articulate hairs; calyx tubular-campulate, 13–15 mm long, prominently nerved, covered with inequiradial, branched and glandular hairs, the teeth triangular or broadly rounded, with spinous point 1 mm long from apical notch; corolla 2 mm long, all white or the lower lip yellow or all yellow, the tube slightly exserted; upper lip somewhat curved, densely pubescent outside, long-haired at margin inside; lower lip with obcordate middle lobe and ovate lateral lobes; tube with a ring of hairs; appendages of filaments longitudinal, short-fimbriate; nutlets densely bearded. May–June.

Mountain areas, up to high foothills, in rocky places. — Centr. Asia: Pam.-Al. Endemic. Described from Aman-Kutan. Type in Leningrad.

Series 10. *Pauciflorae* M. Pop. Monogr. (1940) 114. — Plants almost completely glabrous, destitute of stellate hairs; stems opposite-branched in upper part; leaves coriaceous, pinnatifid or pinnatipartite, rarely almost simple; flowers solitary, on opposite pedicels, subtended by 2 linear-subulate bracts; calyx glabrous, tubular, limbless, with short teeth; corolla white, the lower lip yellow; appendages of filaments longitudinal, the upper thickened, fimbriate-lacerate, the lower obsolescent; ring of hairs under the appendages.

38. *E. transoxana* Bge. in Mém. sav. étrang. Acad. Sc. Pétersb. VII (1851) 441 et in Mém. Acad. Sc. Pétersb. VII sér. XXI, 79; Boiss. Fl. or. IV, 796; Regel' in Tr. Bot. sada, VI, 381 and IX, 566; Popov, Monogr. 114. — **Ic.:** Regel', op. cit. IX, Plate VI, 5–6.

Perennial, with tuberous napaceous root; stem solitary, glabrous, simple, divaricately branched near the top; radical leaves numerous, surrounded by sheaths of dead leaves, 42 pinnatipartite, 16–18 cm long, the segments oblong or linear, the terminal segments linear; cauline leaves smaller, the segments narrow, linear, point-tipped; floral leaves oblong-lanceolate, acuminate, the uppermost spinescent, the lower exceeding, the upper shorter than the whorls; petioles of radical leaves 11–13 cm long, dilated at base, channeled; petioles of cauline leaves 5–6 cm long; floral leaves sessile; upper side of leaves green, with scattered pubescence, the lower side glabrous; inflorescence long-branched, the branches opposite; flowers borne singly in the axils, on glabrous opposite pedicels 8–10 mm long; bracts linear, mucronate, with a prominent midrib, 7–17 mm long; calyx tubular-campanulate, coriaceous, glabrous, 13–15 mm long (excluding teeth), teeth rounded-ovate or rounded-triangular, 3.5–4 mm long, with spinous point 3 mm long; corolla pinkish-white, the middle lobe of lower lip obcordate, orange, the lateral lobes broadly rounded; upper lip hairy at margin inside; upper filaments with spreading lateral appendages; lower filaments unappendaged; lobes of stigma obsolescent; nutlets densely bearded at apex. May.

Sands. — Centr. Asia: Kyz. K. Endemic. Described from Kyzyl-Kum. Type in Paris.

39. *E. paniculata* Rgl. in Tr. Bot. sada, VI (1879) 381; in Tr. Obshch. lyub. est. antrop. i etnogr. (1882) 69; in Tr. Bot. sada, IX (1886) 565; Popov, Monogr. 115. — **Ic.:** Regel', op. cit. IX, Plate VI, Fig. 7–8.

Perennial, 25–40 cm high; root tuberous; stems slender, brittle, glabrous, erect, widely branched above; radical and lower cauline leaves almost simple, with uneven rounded teeth, or pinnate with narrow linear segments, coriaceous; floral leaves simple, smaller; radical and lower cauline leaves petiolate, the floral subsessile; leaves pubescent on both sides; flowers borne singly in the axils, on opposite pedicels 2–3 cm long; bracts linear-subulate or subulate, mucronate, ciliate or glabrous, 8–13 mm long; calyx subcampanulate, 15–17 mm long, coriaceous, glabrous, the broad-ovate teeth with point 1 mm long; corolla white (?), the hood slightly curved, bearded at margin inside; lower lip flabellately 3-lobed, longer than the upper, the middle lobe obcordate, shallowly emarginate, the lateral lobes ovate-orbicular; appendages of upper filaments with short fasciculate appendages, those of lower filaments narrow, lamellate; ring of hairs squamate, distant from the appendages; lobes of stigma subequal; nutlets densely bearded. May.



- 43 Foothill plateaus, on sandy soils. — Centr. Asia: Kyz. K. Endemic. Described from Kyzyl-Kum. Type in Leningrad.

Note. A plant collected by A.S. Porecki represents a transitional form between this and the preceding species.

Series 11. *Spectabiles* M. Pop. Monogr. (1940) 116. — Stems tall, sturdy; radical leaves coarse, broad-ovate in outline, pinnatisect or pinnatifid; whorls with 2 short branches in the crotch; calyx teeth short, broad, with a stout spinous point on the back; corolla yellowish-red; upper lip half the length of the lower, beardless; appendages of upper filaments spurlike, papillose; lower filaments unappendaged.

40. *E. tadschikistanica* B. Fedtsch. in Tr. Tadj. bazy AN SSSR, II (1936) 156; Popov, Monogr. 118. — *E. spectabilis* M. Pop. op. cit. 117.

Perennial, to 2 m high; root collar densely lanate-tomentose; stems 4-angled, yellowish-brown, erect, glabrous, widely distant, the branches opposite; radical leaves 55 cm long, pinnatisect near base, the lower 1 or 2 segments remote, sessile, oblong, to 20 cm long, to 5 cm broad at base, emarginate, unevenly lobed or coarsely double-crenate; floral leaves small, rounded-ovate, entire or sparingly toothed, subobtusate or acuminate; petioles of radical leaves stout, 30–33 cm long, glabrous, sometimes pubescent at angles; cauline leaves short-petioled; floral leaves sessile; flowers on pedicels 1.5–2 mm long, bracteate, the central flower ebracteate; whorls 10–12-flowered, the upper sometimes 2-flowered; inflorescence interrupted, of 8–10 distant whorls forming a long loose spike; bracts subulate or filiform, 2–3 mm long, all glabrous; calyx sulcate, glabrous, 11–12 mm long including teeth, the teeth short, broad, subulate from triangular base, spreading, separated by small subsidiary teeth; corolla bright yellow, 25–27 mm long, twice the length of calyx; upper lip about half the length of the lower, 5–8 mm long, with scattered pubescence outside, hairless at margin inside, slightly curved at apex; lower lip 13–15 mm long, the middle lobe large, broadly reniform, shallowly emarginate, the lateral lobes semiorbicular; upper filaments with thick papillose-calcariform appendages, the lower filaments unappendaged; ring of hairs well developed; nutlets densely bearded at apex. May–June. (Plate III, Figure 1.)

Gravelly places in mountains. — Centr. Asia: Pam.-Al. Endemic. Described from Varzob valley. Type in Leningrad.

- 44 Section 2. *Metaxoides* Briq. in Pflanzenr. (1895) 274. — Calyx tubular-campanulate or campanulate, the large teeth spreading in fruit, the limb short, coriaceous, reticulate-nerved; leaves pinnatipartite or pinnatifid, rarely simple.

Series 1. *Campanulatae* M. Pop. Monogr. (1940) 119. — Whorls mostly 2-flowered, more rarely 4–6-flowered; corolla white, the lower lip yellow; appendages of upper filaments longitudinal, long-fimbriate, those of lower filaments spurlike or absent.





PLATE III. 1 — *Eremostachys tadschikistanica* B. Fedtsch., radical leaf, part of inflorescence, flower; 2 — *E. regeliana* Aitch., general aspect, calyx, corolla.

41. *E. subspicata* M. Pop. Monogr. (1940) 121.

Perennial, with a long root; root collar tomentose-lanate; stems 20–30 cm long, erect, covered with forked and capitate glandular hairs, at nodes lanate-pubescent with forked and glandular capitate hairs; radical leaves oblong in outline, 7–10 cm long and 2–3.5 cm broad, pinnatifid, with irregular triangular-ovate or broadly lanceolate unevenly incised-dentate lobes, with obtusish teeth; cauline leaves resembling the radical but smaller; floral leaves ovate, entire at base, dentate above; petioles of radical leaves short, broad, woolly at margin on inner side; cauline leaves glabrous above, hairy on the veins and at margin beneath; inflorescence branching; whorls subdistant, 2-flowered, the lower 4- or rarely 6-flowered; bracts subulate, fine-pointed, 11–14 mm long, covered with long furcate and articulate hairs, reclinate, half to three-fourths the length of calyx; calyx tubular-campanulate, in fruit campanulate, 15–26 mm long, covered with furcate and branched hairs, densely so in lower half, sparsely above; calyx teeth reclinate, broadly rounded, notched, 2 mm long, with a stout spinous point 1.5–2 mm long; corolla white (?); upper lip narrow, falcately curved, hairy outside, densely bearded at margin inside; lower lip yellow, longer than the upper, the middle lobe obcordate, the lateral lobes broad-ovate; filaments pubescent, the upper with long enlarged fasciculate-47 fimbriate appendages, the lower filaments unappendaged; ring of hairs under the appendages. April–May.

Stony slopes in foothills. — Centr. Asia: Mtn. Turkm. Endemic. Described from Bol'shie Balkhany Mountains. Type in Leningrad.

42. *E. boissieriana* Rgl. in Tr. Bot. sada, IX (1886) 559; Popov, Monogr. 121. — *E. Beckeri* Rgl. op. cit. 561; Popov, op. cit. 22. — *E. pauciflora* O. Kuntze in Tr. Bot. sada, X (1887) 226. — *lc.*: Regel', op. cit. Plate VIII.

Perennial; roots long, with tuberiform swellings; root collar tomentose-lanate; stems 20–40 cm long, covered with long flat hairs, densely woolly at nodes, subdistant from base, the branches ascending; radical leaves oblong, pinnatipartite in var. *pinnatipartita* M. Pop. (in var. *pinnatifida* M. Pop. *pinnatifid*), the lobes ovate-lanceolate, unevenly toothed or rounded-toothed, decurrent at base; cauline leaves resembling the radical but smaller, amplexicaul at base; floral leaves ovate, entire at base, short-toothed above, equaling or exceeding the whorls; petioles of radical leaves short, dilated at base; upper side of leaves glabrous, the lower side with white veins covered with scattered moniliform 3–5-jointed hairs; inflorescence long, branched; flowers paired in whorls; whorls more or less approximate, forming a spikelike inflorescence; bracts thin, becoming coarse in fruit, 9–16 mm long, half to three-fourth the length of calyx, covered with fine multiarticulate hairs; calyx campanulate, strongly accrescent in fruit, coriaceous-membranous, covered all over, more densely at base, with multiarticulate as well as branched and flat moniliform hairs, the limb glabrous, the teeth short, ovate, terminating in a thick reclinate spine 1.5–2 mm long; corolla exserted; upper lip white, narrow, falcately curved, sparsely pubescent outside, densely bearded inside; lower lip yellow, the middle lobe obcordate, the lateral lobes orbicular, as long as or shorter than the middle lobe; appendages of upper filaments broad, fimbriate-lacerate, those of lower filaments short, pectinate; ring of hairs under the appendages. April–May.

Sandy places. — Centr. Asia: Pam.-Al., Mtn. Turkm. Endemic. Described from Tadzhikistan (Khodzha-Kadian Mountains). Type in Leningrad.

43. *E. regeliana* Aitch. et Hemsl. in Trans. Linn. Soc. ser. II, vol. III (1888) 99; Popov, Monogr. 123. — *E. bachardenica* B. Fedtsch. in Bot. zhurn. SPb (1906) I; in Tr. Bot. sada, XXVIII (1912) 55; Popov, op. cit. 125. — Exs.: HFAM, No. 214.
- 48 Perennial, 30–40 cm high; roots long, slender, tuberiferous; root collar densely covered with white woolly tomentum; stems sturdy, stiff, whitish or brownish-purple, divaricately branched in middle part; branches ascending, arachnoid-pubescent with articulate moniliform hairs as well as ribbonshaped, forked and glandular hairs, lanate-tomentose under the nodes; radical leaves bipinnatisect, 10–15 cm long, the lower segments decurrent or short-petioluled, the upper sessile; cauline leaves similar but smaller; lower floral leaves pinnatilobate, the lobes entire at base, 2–4-toothed above, the upper entire, short, the lower exceeding, the upper as long as the whorls (in var. *integra* Knorr. leaves simple, elliptical-lanceolate, unevenly toothed or dissected with linear toothed lobes); petioles of radical leaves dilated, 5–11 cm long; upper side of leaves glabrous or with isolated hairs on the veins, the margins with scattered multiarticulate moniliform and glandular hairs; whorls subdistant, 2-flowered, forming a branched oblong-ovoid spikelike inflorescence; bracts subulate, 5–10 mm long, arachnoid-pubescent with long flat moniliform hairs interspersed with ribbonlike and glandular hairs; calyx accrescent in fruit, subglabrous, the teeth broadly rounded, 2.5–4 mm long, spinose, the spine as long as or longer than the tooth; corolla white? (in var. *brachycalys* M. Pop. exserted from calyx tube); upper lip narrow, falcately curved, very sparsely hairy at margin inside; lower lip equaling to greatly exceeding the upper, the middle lobe broadly obcordate, the lateral lobes obovate, rounded and shorter, with unevenly crenulate margin; filaments arachnoid-pubescent, exserted, the upper with proximally enlarged long-fimbriate appendages, the lower unappendaged; stigma lobes unequal; ring of hairs squamate, under the appendages; nutlets hairy at apex. March–April. (Plate III, Figure 2.)

Sandy hills and sands. — Centr. Asia: Mtn. Turkm., Pam.-Al. **Gen. distr.:** Afghanistan. Described from Afghanistan. Type in Leningrad.

Series 2. *Ovalifoliae* M. Pop. Monogr. (1940) 126. — Root stout, subnapaceous; radical leaves simple, ovate, small, with crenate margin; calyx tubular-campanulate, hispid, nearly limbless, the teeth subpatent; lower lip of corolla yellow, the upper lip white, the tube with a ring of hairs at the middle; appendages of upper filaments longitudinal, fimbriate, enlarged at base, those of lower filaments absent or consisting of stiff hairy scales.

- 49 44. *E. phlomoides* Bge. in Ldb. Fl. alt. II (1830) 414; Benth. Lab. Gen. et sp. 637 et in DC. Prodr. XII, 548; Ldb. Fl. Ross. III, 440; Regel' in Tr. Bot. sada, VI, 386 and IX, 561; Popov, Monogr. 127; Kryl. Fl. Zap. Sib. IX, 2337. — **lc.:** Ldb. Ic. pl. Fl. Ross. tab. 122; Regel', op. cit. IX, Plate VII.

Perennial, 15–30 cm high; root napaceous; root collar tomentose-lanate; stems erect, sturdy, branched above the base, lanate, densely covered with horizontally spreading 5–6-jointed hairs intermixed with sparse moniliform and glandular hairs, the indument denser at the nodes; radical leaves ovate to broadly oblong-ovate, cordate or



rounded at base, obtusish at apex, 5–8 cm long and 3–4 cm broad, the margin deeply and coarsely crenate; cauline leaves similar, smaller, cuneate at base, entire, only at apex dentate, acuminate, the uppermost narrowly cuneate at base, as long as or slightly shorter than the whorls; petioles of radical leaves dilated at base, 4–7 cm long, with indument as on stems, those of cauline leaves short; lower floral leaves sessile, covered on both sides, more densely beneath, with flexuous flat and glandular hairs; whorls numerous, the lower subdistant, the upper closely approximate, 2–6–8-flowered (in var. *dschungarica* M. pop. whorls 2-flowered); bracts subulate-acuminate, 10–14 mm long, connate at base in 3's, covered with 3–4-jointed and sparse glandular hairs; calyx campanulate, 14–17.5 mm long including teeth (in f. *macrantha* M. Pop. 13–17 mm long), covered with 5–6-jointed and glandular hairs, the teeth broadly triangular-subulate or rounded, 4–7 mm long, with spine 3–4 mm long; corolla 20 mm long (in f. *macrantha* M. Pop. 25 mm long); corolla tube included in calyx, rarely exserted; upper lip white, densely long-hairy at margin inside; lower lip yellow, the middle lobe obcordate, ca. 10 mm broad, the lateral lobes ovate-orbicular; upper filaments with short fimbriate appendages, the lower filaments unappendaged; nutlets long-bearded. May–July.

Dry slopes and steppes. — W. Siberia: Irt.; Centr. Asia: T. Sh. Described from Altai. Type in Leningrad.

Note. M. G. Popov distinguishes two geographical races, Altai and Tien Shan respectively, differing in the number of flowers in the whorl. This character is, however, inadequate since in Tien Shan *E. phlomoides* has both 2-flowered and 4–6-flowered whorls.

45. *E. desertorum* Rgl. in Tr. Bot. sada, IX (1886) 563; Popov, Monogr. 129. — Ic.: Regel<sup>9</sup>, op. cit. Plate VIII, Fig. 5–6.

- 50 Perennial; root stout, napaceous, tuberously swollen; stems 20–30 cm long, stout, erect, 4-angled, branched nearly from base, densely covered with thick spreading 3–5-jointed hairs, the hairs under the nodes finer, intermixed with glandular hairs; radical leaves rounded-ovate or ovate, subobtus, the margin with uneven rounded teeth or often with short sharp teeth, the broad ascending petioles 4–6 cm long, with articulate and glandular hairs; cauline leaves similar, sessile or short-petioled; bracts oblong-elliptic, cuneate at base, acuminate; upper side of leaves rugose, with indument as on petioles intermixed with flat moniliform hairs, the lower side with similar hairs and also thick articulate hairs on the veins; whorls composed of 6 sessile flowers, the lower distant, the upper approximate; bracts 17–18 mm long, densely covered with 4–5-jointed and glandular capitate hairs; calyx campanulate, 17–24 mm long including teeth with indument as on bracts, the teeth triangular-lanceolate, 8–11 mm long, subulately long-acuminate, terminating in a glabrous point (in var. *longispina* M. Pop. teeth and point 5–6 mm long, in var. *brevispina* M. Pop. the teeth shorter [?] than the point, 2–4 mm long); corolla slightly exserted from calyx, 22–25 mm long (in var. *brevispina* M. Pop. 27 mm long); upper lip falcately curved, white-haired outside, narrow, nearly as long as the lower, white; lower lip yellow, the middle lobe obcordate, unevenly short-toothed at apex, the lateral lobes broadly obovate, shorter; appendages of upper filaments broad, lamellate-fimbriate, those of lower filaments rudimentary; ring of hairs under the appendages; nutlets with dense long hairs at apex. April.



Clayey and pebbly foothill plains. — Centr. Asia: Syr D., Pam.-Al. Endemic. Described from Kermine. Type in Leningrad.

Ssp. *ferganensis* M. Pop. op. cit. — Limb of calyx broad, the teeth triangular-ovate, terminating in a strong spine. — Fergana Valley.

Note. According to Popov, var. *longispina* M. Pop. is associated with lowland habitats, while var. *brevispina* M. Pop. grows in mountain areas.

*E. karataviensis* Pavl. (Vestn. Akad. nauk Kazakhstana, 8, 1950, 20) is closely related to *E. desertorum* Rgl.; it is distinguished by the short petioles of its radical leaves, more floriferous whorls, and free bracts that are shorter than in *E. desertorum* (18–21 mm as against 25–27 mm). Its position as a distinct species is uncertain.

46. *E. aralensis* Bge. Rel. Lehm. (1851) 42; Walpers. Ann. bot. V, 701, non Rgl.;  
51 Bge. in Mém. Acad. Sc. Pétersb. VII sér. XXI, 79; Boiss. Fl. or. IV, 796; Kryl. Fl. Zap Sib. IX, 2338; Popov, Monogr. 130.

Perennial, 10–45 cm high; stems several from base, curved, white, glabrous in lower part, densely covered above with 3–5-jointed, branched and glandular hairs, more densely at the nodes; lower leaves ovate-oblong, coarsely crenate, 6–10 cm long and 3–4 cm broad, sparsely covered above with appressed multiarticulate forked hairs and very few glandular hairs, glabrous beneath with white veins, with articulate hairs confined to the margin; upper cauline hairs smaller; floral leaves oblong-lanceolate, toothed near apex, entire below, tapering from cuneate base; uppermost leaves lanceolate, exceeding the whorls; petioles of radical leaves 10–13 cm long, those of upper cauline and lower floral leaves broad, 1.5 to 4 cm long; upper floral leaves sessile; lowermost 2 whorls distant, the other 5–6 approximate, forming a long spikelike inflorescence; semiverticels 2-flowered; bracts 10–24 mm long, finely subulate, exceeding the calyx, covered with 3–5-jointed hairs; calyx campanulate, densely covered from base to teeth with long multiarticulate hairs; calyx teeth broad-ovate, 4–6 mm long, terminating in a rigid point 2–5 mm long; corolla greatly exceeding the calyx, white (?); lower lip yellow; appendages of upper filaments short, broad, fimbriate, recurved; lower filaments unappendaged; ring of hairs in corolla tube under the appendages; nutlets narrowly trigonous, with dense short hairs at apex, glandular at margin. June.

Sandy steppes, in *Artemisia* and *Ferula* scrub associations. — Centr. Asia: Kyz. K. Endemic. Described from Batkak-Kum. Type unknown.

Note. A report on the occurrence of this species in the Zaisan Plain (Kryl. op. cit.) is dubious.

47. *E. tianschanica* M. Pop. Monogr. (1940) 130. — Ic.: op. cit. Plate 9.

Perennial, 25–40 cm high; root collar white, tomentose-lanate; stems erect, simple or branched, sturdy, densely covered with 3–4-jointed hairs and fewer stipitate glandular hairs; radical leaves ovate-cordate or orbicular, with large short rounded teeth; cauline leaves similar; floral leaves obovate, cuneate at base; petioles of radical leaves broad, 3–7 cm long, covered with articulate moniliform and glandular hairs; cauline  
52 leaves short-petioled; floral leaves sessile; both leaf sides with indument as on petioles with addition of simple hairs above and monoradial hairs beneath; inflorescence composed of numerous approximate 6–8-flowered whorls; bracts lance-subulate, slightly

curved, 13–15 mm long, densely covered with flat articulate moniliform and glandular hairs; calyx tubular-campanulate, expanded upward, 22–25 mm long, the teeth short, broad or broadly triangular, slightly spreading, 5–9 mm long, terminating in a stout rigid spine 2–5 mm long; tube densely covered in lower part with 2–3-jointed, flat moniliform and very numerous stipitate glandular hairs; corolla 30–35 mm long; upper lip white, densely hairy at margin inside; lower lip longer, yellow, the middle lobe obcordate, unevenly crenulate, the lateral lobes broadly rounded or ovate; appendages of upper filaments short, oblong, obtuse, recurved, not incised, in some specimens rudimentary but always present; ring of hairs in corolla tube well under the appendages; nutlets with long white hairs at apex. July–August.

Subalpine and alpine zones, on gravelly slopes. — Centr. Asia: T.Sh. (W.). Endemic. Described from Karatau. Type in Tashkent.

Section 3. *Moluccelloides* Bge. in Mém. Acad. Sc. Pétersb. VII sér. XXI (1873) 442. — Calyx infundibular, the limb very broad, membranous, reticulate, rotate, campanulate or patelliform; root tuberous-napaceous.

Series 1. *Molucceliformes* M. Pop. Monogr. (1940) 131. — Root napaceous; radical leaves simple, oval, with crenate margin, more or less hispid beneath; bracts subulate, filiform or absent; calyx at first abruptly expanded, in fruit with a broad membranous patelliform or broadly campanulate limb and short teeth; appendages of upper filaments longitudinal, fimbriate, those of lower filaments absent or transverse, squamate.

48. *E. mogianica* M. Pop. Monogr. (1940) 132.

Perennial; root collar white-woolly with long hairs; stems 10–25 cm long, branched nearly from base, densely covered with spreading 3–5-jointed, flat articulate and glandular hairs; branches with similar indument; radical and lower cauline leaves rounded-elliptic or oblong-ovate, 5–7 cm long and 3–6 cm broad, cordate or rounded at base, rarely cuneate and with rounded teeth; floral leaves ovate, somewhat tapering at base, with broad petiole; uppermost leaves orbicular, sharp-toothed at apex; petioles of radical leaves 3–7 cm long, densely covered with 3–5-jointed hairs; floral leaves subsessile; upper side of leaves with scattered hairs as on petiole; lower side gray, densely beset on the veins with 3–6-jointed, branched and ribbon-shaped hairs, sparsely covered between the veins with similar as well as numerous glandular hairs; inflorescence branched in lower part; whorls 4–6-flowered, the lower subdistant, the others approximate; bracts filiform, exceeding the calyx, spinescent, 10–12 mm long, covered with fine 3–6-jointed and glandular hairs; calyx campanulate, densely covered with fine branched articulate and glandular hairs, the teeth elliptic-lanceolate, 11 mm long including point; corolla 12–16 mm long, slightly exceeding the calyx; upper lip white, shorter than the lower, densely hairy outside, densely bearded at margin inside; lower lip yellow, the middle lobe obcordate, the lateral lobes rounded; appendages of upper filaments broad, loosely fimbriate-incised, those of lower filaments small, hairy-squamiform; ring of hairs in corolla tube under the appendages; nutlets furrowed, long-haired at apex. May.

Mid-mountain zone, on stony slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Mogian. Type in Leningrad.

49. *E. tuberosa* (Pall.) Bge. in Ldb. Fl. alt. II (1830) 416; Benth. Lab. Gen. et sp. 637 et in DC. Prodr. XII, 549; Ldb. Fl. Ross. III, 440; Bge. in Mém. Acad. Sc. Pétersb. VII sér. XXI, 78; Rgl. in Tr. Bot. sada, VI, 382 and IX, 564; Popov, Monogr. 133. — *Moluccella tuberosa* Pall. Reise, III (1776) Anhang, 738. — *Phlomis inderiensis* Schmalh. Fl. II (1897) 344. — Ic.: Regel', op. cit. Plate IX, Fig. 6, 7, 8.

Perennial; root collar lanate-tomentose; stems 15–40 cm long, erect or [?] branched nearly from base; branches ascending, white, glabrous or sparsely covered with 4–6-jointed hairs and even sparser glandular hairs; radical leaves elliptic or orbicular, cuneate at base, 6–14 cm long and 6–9 cm broad; cauline leaves similar, 5 cm long and 3 cm broad, all unevenly doubly crenate; floral leaves rhomboidal, cuneate at base, the lower equaling the whorls, the upper as long as or shorter than the whorls; petioles of radical leaves 3–8 cm long, broad, fuberate; upper side of leaves glabrous or with scattered fine branched and flat articulate hairs, the lower side more densely covered with 2–3-jointed  
54 and glandular hairs; whorls 4–6-flowered, the lower 2-flowered, distant, the upper approximate, forming an oblong spikelike inflorescence; bracts absent or, if present, rudimentary, subulate; calyx tubular-campanulate, glabrous (with scattered hairs before anthesis), sulcate, infundibular-dilated toward apex, 15–19 mm long, with broadly campanulate membranous limb, the teeth broadly rounded, 2–3 mm long, with a point 4 mm long; fruiting calyx strongly accrescent; corolla yellow or white turning yellow, 32–40 mm long, nearly twice the length of calyx; upper lip narrow, about as long as the lower, sparsely pubescent outside, hairy at margin inside; middle lobe of lower lip obcordate, unevenly crenulate, the lateral lobes broadly oblong; appendages of upper filaments short, fimbriate; ring of hairs in middle part of corolla tube under the appendages; stigma with unequal lobes; nutlets long-haired at apex. May.

Sandy and clayey semidesert, in *Artemisia* and *Artemisia-Anabasis* associations. — European part: L.V.; W. Siberia: U. Tob.; Centr. Asia: Ar.-Casp., Kyz.K. Described from Inder Lake. Type in Leningrad.

50. *E. affinis* Schrenk in Bull. Acad. Sc. Pétersb. III (1845) 211; Popov, Monogr. 133. — *E. tuberosa* γ. Schrenkii Rgl. in Tr. Bot. sada VI (1879) 382 and IX (1886) 567. — *E. moluccelloides* γ. Schrenkii M. Pop. op. cit. 133.

Perennial; root collar lanate-tomentose; stems 10–20 cm long, erect, stout, rarely with short divaricate branches, covered with long fine 2–3-jointed hairs, more densely so at nodes; radical leaves orbicular or elliptic, cuneate at base, obtusish, unevenly lacerate-dentate, 4–7 cm long and 3–4 cm broad; floral leaves rhomboid, broadly cuneate at base, entire below, toothed above, the lower exceeding the verticillasters, the upper shorter; petioles of radical leaves 2.5–3 cm long, pubescent, fulcrate; upper side of leaves sparsely covered with fine branched and 2–3-jointed hairs, the lower side with prominent white veins, covered with fine articulate branched and glandular hairs; flowers sessile, in 4–6-flowered approximate whorls; bracts absent; calyx tubular-campanulate, 2–25 mm long, the tube finely sulcate, covered with articulate simple and moniliform as well as glandular hairs; limb of calyx netted-nerved, infundibular, the



teeth rounded, 2–3 mm long, subulate-pointed; corolla slightly exceeding the calyx; 55 upper lip white, narrow, equaling the lower, slightly curved, bearded at margin inside; lower lip yellow, the middle lobe obcordate, the lateral lobes broadly elliptic; all filaments appendaged, slightly arachnoid, the appendages of upper filaments broad, fimbriate; nutlets with a dense tuft of short hairs at apex. May–June.

Plains and foothills in wormwood-saltwort and wormwood deserts. — W. Siberia: U. Tob.; Centr. Asia: Balkh., T. Sh. (Karatau Mountains). Endemic. Described from Balkhash, river Atassu. Type in Leningrad.

51. *E. moluccelloides* Bge. in Ldb. Fl. alt. II (1830) 415; Benth. in DC. Prodr. XII, 549; Ldb. Fl. Ross. III, 441; Regel' in Tr. Bot. sada, IX, 569; Popov, Monogr. 134; Kryl. Fl. Zap. Sib. IX, 2337. — *E. macrophylla* Montbr. et Auch. in Ann. Sc. Nat. sér. 2. VI (1836) 54; Benth. Lab. Gen. et sp. 638 et in DC. Prodr. XII, 549; Bge. Mém. Akad. Sc. Pétersb. VII sér. XXI, 79; Boiss. Fl. or. IV, 797; Grossg. Fl. Kavk. III, 300. — *E. pyramidalis* Jaub. et Spach, Illustr. pl. nov. or. (1853–1857) V, 69, tab. 462. — Ic.: Ldb. Ic. pl. Fl. Ross. tab. 437; Regel', op. cit. Plate IX, Fig. 12–14; Jaub. et Spach, l. c. 462.

Perennial, 40 cm high; root collar lanate; stems stout, branched at middle and below, rarely simple, densely lanate or more sparsely pubescent, the hairs articulate, flexuous and glandular; lower leaves elliptic to orbicular, 5–10 cm long and 4–6 cm broad; cauline leaves similar but smaller, doubly crenate; floral leaves rhomboid or elliptic, entire or sharp-toothed at apex, 4–4.5 cm long and 3–3.5 cm broad; petioles of lower leaves 4–6 cm long, covered with multiarticulate and glandular hairs; floral leaves sessile; upper side of leaves green, sparsely covered with short and flat hairs or glabrous, the lower side with scattered multiarticulate and glandular hairs; whorls mostly closely approximate, 4–6-flowered, the upper whorls sometimes 2-flowered, forming a long spikelike inflorescence; bracts subulate or linear to filiform-linear, 9–15 mm long, three-fourths as long or rarely as long as the calyx, covered with fine multiarticulate and glandular hairs; calyx infundibular, 30–40 mm long, strongly accrescent in fruit, the tube narrowly campanulate, with multiarticulate and glandular hairs, sometimes densely white-lanate, dilated above, with open membranous reticulate limb, the teeth semiorbicular or triangular, spinous-tipped; corolla as long as or shorter than calyx; upper lip yellow, pubescent outside, long-bearded at margin inside; lower lip bright yellow or orange, the middle lobe obcordate, the lateral lobes ovate or oblong, obtusish; corolla tube with ring of hairs above the middle; appendages of upper filaments lamel- 56 late at base, fimbriate, those of lower filaments squamate, confluent with the ring of hairs; nutlets densely bearded at apex. May–June.

Sandy and stony steppes in foothills and plains. — W. Siberia: Irt., Alt.; Centr. Asia: Balkh., Dzu.-Tarb., Syr D., Pam.-Al., T. Sh. **Gen. distr.:** Bal.-As. Min., Iran., Ind.-Him., Dzu.-Kash., Mong. Described from Altai. Type in Leningrad.

var. *macrophylla* Rgl. l. c., 570. — Calyx infundibular, strongly accrescent in fruit; radical leaves ovate to orbicular, tomentose. — Caucasus: S. and E. Transc.; Centr. Asia: Mtn. Turkm.

Note. This variety should perhaps be recognized as a distinct species, following the treatment of Grossgeim in his Flora of the Caucasus.



52. *E. rotata* Schrenk ex. Fisch. et Mey. Ind. sem. hort. Petrop. IX, Suppl. (1844) 3; Benth. in DC. Prodr. XII, 549; Ldb. Fl. Ross. III, 440; Bge. in Mém. Acad. Sc. Pétersb. VII sér. XXI, 79; Regel' in Tr. Bot. sada, IX, 556; Popov, Monogr. 137. — *E. moluccelloides* γ. *rotata* Rgl. in Tr. Bot. sada, VI (1879) 332. — Ic.: Regel', op. cit. Plate IX, Fig. 9–11.

Perennial; stems 15–20 cm long, stout, white, simple or branched from base, covered with 2–3-jointed and glandular hairs, later glabrescent, more densely hairy at nodes; branches also with branched hairs; radical leaves elliptic and elliptic-lanceolate, obtusish, 7.5–9.5 cm long and 1.5–3 cm broad, cuneate at base, unevenly rounded-toothed, sometimes doubly toothed; cauline leaves resembling the radical, smaller; floral leaves rhomboid or obovate, cuneate at base; petioles of radical leaves 5–9 cm long, covered with articulate and glandular hairs; cauline leaves short-petioled; lower floral leaves with short broad petiole, the uppermost sessile, longer or shorter than the whorls; upper side of leaves glabrate or with scattered hairs at margin, the lower side sometimes glabrous or with 1–2-jointed, flat articulate and glandular capitate hairs on the veins; whorls of inflorescence 4–6-flowered, rarely 2-flowered, subdistant; bracts filiform, about one-third to half the length of calyx, the margin beset with 3–4-jointed hairs; calyx broadly campanulate, the tube sulcate, covered with long, 3–4-jointed and glandular hairs; limb strongly accrescent in fruit, glabrous, membranous, rotate, the teeth broadly triangular, sometimes confluent, obtusish or shortly spinescent; corolla white; upper lip narrow, falcately curved, slightly exceeding the lower lip, pubescent outside in upper part, subglabrous below; lower lip yellow, broadly obcordate, the lateral lobes ovate-orbicular; filaments arachnoid, the upper with elongated fringed appendages, the lower unappendaged; ring of hairs in corolla tube under the appendages; lobes of stigma equal; nutlets blackish, finely sulcate, with a dense tuft of short hairs at apex. May.

Sandy deserts. — Centr. Asia: Balkh. Endemic. Described from Karasu-Dzhusagan. Type in Leningrad.

Genus 1266.\* *Phlomis*\*\* L.

L. Sp. pl. (1753) 584

Calyx tubular or tubular-campanulate, prominently 1-nerved; teeth 5, broadly emarginate, long-aristate from the notch, or rounded, subulate-pointed; tube slightly dilated above, with a ring of hairs inside; upper lip arched-concave, compressed laterally or not compressed, covered at margin inside with copious long or sparse short hairs; lower lip 3-lobed; stamens 4, under upper lip, the upper pair mostly appendaged at base; anthers 2-celled, the cells divergent; style lobes of unequal length; nutlets trigonous, obtuse or truncate at apex, with a dense tuft of hairs or glabrous. Perennials or subshrubs with broad-ovate, triangular or linear leaves; flowers yellow, lilac or pink, in verticillasters forming a spikelike inflorescence.

\* Treatment by O. E. Knorring.

\*\* Name derived from phlox, fire, probably on account of the woolly leaves of some species that were used as wicks.

The genus comprises more than one hundred species, distributed over a huge area. There are 49 species on the USSR territory; of these the great majority grow in Soviet Central Asia (37 species), 30 of them endemic. The remaining species are distributed in the European part of the USSR, the Caucasus, Western Siberia and the Far East.

Note. An important taxonomic character in the genus *Phlomis* is the indument which varies greatly. The hairs may be stellate, with unequal rays [inequiradial], in some species one of the rays 3–15 times longer than the others [monoradial hairs]. Certain species are clothed with eglandular articulate hairs, either long or short; the indument of some species consists of branched and glandular hairs.

- 58 **Economic importance.** Species of *Phlomis* L. do not at present find any practical use; there is no doubt, however, that some species are rich in essential oil, not so far investigated. Certain species are used in popular medicine. The tuberous swellings of *Phlomis tuberosa* have a high starch content and are sometimes used for food. Many species deserve attention as ornamentals.
1. Upper lip of corolla large, compressed laterally, the margin of the hood not bearded (sparse short hairs occur); lateral lobes of lower lip small, the middle lobe large, broadly rounded (section 1. *Euphlomis* Benth.) . . . . . 2.
  - + Upper lip of corolla free, not compressed laterally, the hood densely bearded at margin inside; lateral lobes of lower lip scarcely smaller than the middle lobe (section 2. *Phlomoides* (Moench) Briq.) . . . . . 28.
  2. Nutlets glabrous at apex . . . . . 3.
  - + Nutlets bearded at apex . . . . . 26.
  3. Flowers orange, yellow or creamy-pink . . . . . 4.
  - + Flowers lilac, purple or dark pink . . . . . 11.
  4. Flowers orange or yellow . . . . . 5.
  - + Flowers creamy-pink . . . . . 8.
  5. Leaves elliptic, lanceolate, oblong-lanceolate or cordate-ovate; flowers yellow. . . . . 6.
  - + Leaves oblong-ovate, ovate or cordate-ovate, cuneate at base; flowers orange . . . . . 1. *Ph. fruticosa* L.
  6. Filaments unappendaged; leaves oblong-lanceolate; flowers yellow . . . . . 2. *Ph. caucasica* Reching. fil.
  - + Filaments appendaged . . . . . 7.
  7. Leaves cordate-oval, coarsely crenate, 14 cm long and 9 cm broad; bracts connate at base, 20–30 mm long . . . . . 4. *Ph. tomentosa* Rgl.
  - + Leaves elliptic or ovate-lanceolate, 9–13 cm long and 3.5–5.5 cm broad, entire or sparingly toothed; bracts half to two-thirds the length of calyx . . . . . 3. *Ph. bucharica* Rgl.
  8. Radical and lower cauline leaves ovate or oblong-ovate, entire or sparingly toothed; verticillasters few-flowered . . . . . 9.
  - + Radical and lower cauline leaves broad-ovate, coarsely crenate; verticillasters . . many-flowered . . . . . 10.
  9. Leaves white-tomentose beneath, sparsely stellate-hairy above; bracts 20–25 mm long, greatly exceeding the calyx; upper lip of corolla falcately curved; appendages of filaments short, broad, reclinate . . . . . 9. *Ph. tenuis* Knorr.

- + Leaves finely stellate-pubescent beneath, coriaceous above, dull or lustrous, sparsely covered with stellate hairs, including monoradial; bracts 10–15 mm long; upper lip of corolla straight or curved only at apex; appendages of filaments spurlike . . . . . 8. *Ph. nubilans* Zak.
10. Leaves 14–19 cm long and 7–12 cm broad, with petioles 13–15 cm long; appendages of filaments short, recurved; corolla twice as long as calyx. . . . . 11. *Ph. zenaidae* Knorr.
- + Leaves 8–9.5 cm long and 5.5–6 cm broad, the broad petioles 2.3 cm long; appendages of filaments narrowly linear, spurlike; corolla equaling or exceeding the calyx . . . . . 10. *Ph. angrenica* Knorr.
11. Flowers dark pink . . . . . 12.
- + Flowers lilac or purple . . . . . 14.
12. Appendages of filaments broad, spurlike; lower leaves oblong-lanceolate, with undulate or finely toothed margin, 25 cm long and 6 cm broad; bracts recurved, 15–17 mm long . . . . . 12. *Ph. fruticetorum* Gontsch.
- + Appendages of filaments broad, spreading, spurlike, linear; lower leaves sparingly and coarsely toothed or entire . . . . . 13.
13. Verticillasters many-flowered; lower leaves 9–11 cm long and 5.5–6 cm broad, ovate-elliptic or lance-elliptic; appendages of filaments broad, spreading . . . . . 13. *Ph. sewerzowii* Rgl.
- + Verticillasters few-flowered; lower leaves oblong, 28–30 cm long and 5–6 cm broad; appendages of filaments short, linear, furcate at base . . . . . 20. *Ph. cyclodon* Knorr.
14. Leaves thick, floccose-pubescent with rather large thick stellate hairs, rarely with fine stellate hairs and then bracts and calyx tomentose . . . . . 15.
- + Leaves thinner, covered with small fine stellate and monoradial hairs often interspersed with simple hairs . . . . . 19.
15. Lower leaves cordate or cordate-ovate at base . . . . . 16.
- + Lower leaves rounded-cuneate or narrowly cuneate at base . . . . . 17.
- 60 16. Leaves 12–15 cm long and 5–7 cm broad; bracts 18–30 mm long, free; calyx teeth unequal (3–5 and 8–12 mm long, respectively) . . . . . 5. *Ph. olgae* Rgl.
- + Leaves 7–12 cm long and 3–6 cm broad; bracts connate at base (in 2's, rarely in 3's), 14–18 mm long; calyx teeth mostly equal (1–3 mm long) . . . . . 6. *Ph. thapsoides* Bge.
17. Lower leaves oblong-ovate or ovate-lanceolate, 7–15 cm long and 2.5–5 cm broad, rounded-cuneate at base, almost entire, the petiole 1–2 cm long . . . . . 7. *Ph. spinidens* Nevski.
- + Lower leaves lanceolate or elliptic, 10–15 cm long and 2.5–3 cm broad, crenate, obscurely serrate or entire . . . . . 18.
18. Lower leaves lanceolate, 10–15 cm long and 2–2.5 cm broad, densely covered above with small fine stellate hairs, on lower side with similar closely appressed hairs; calyx teeth short, broad, with subulate point from apical notch. . . . . 18. *Ph. drobovii* M. Pop.
- + Leaves 5–13 cm long and 2–3 cm broad, subglabrous above, niveous-tomentose beneath with stellate hairs; calyx teeth subulate, unequal . . . . . 19. *Ph. betonicifolia* Rgl.



19. Leaves entire or undulate-margined, the radical 16–17 cm long and 5–7 mm broad; appendages of filaments spurlike; upper lip of corolla curved only at apex. . . . . 14. **Ph. linearifolia** Zak.
- + Leaves broader, lanceolate, linear-lanceolate or broad-ovate . . . . . 20.
20. Leaves lanceolate or linear-lanceolate, rounded-cuneate at base, 10–14 cm long and 3.5–6 cm broad, entire or undulate-serrate; bracts mostly connate in 3's; appendages of filaments linear, spurlike, bifurcate at base. . . . . 21.
- + Leaves lanceolate, cuneate at base, 16–20 cm long and 3–5 cm broad; bracts 24–26 mm long, thin, free (rarely connate); appendages of filaments linear, upcurved . . . . . 15. **Ph. salicifolia** Rgl.
21. Verticillasters few-flowered; flowers subsessile . . . . . 22.
- + Verticillasters many-flowered; flowers distinctly short-pedicel; calyx teeth with point 4–6 mm long . . . . . 17. **Ph. hypoleuca** Vved.
22. Lower leaves lanceolate, 10–14 cm long and 3.5–6 cm broad; calyx teeth unequal, 3–5 and 8–10 mm long, respectively . . . . . 16. **Ph. regelii** M. Pop.
- + Leaves oblong-lanceolate, 8–12 cm long and 2–3 cm broad. . . . . 23.
- 61 23. Bracts connate at base, mostly in 3's, linear-subulate . . . . . 25.
- + Bracts subulate, not connate at base (if connate then in 2's) . . . . . 24.
24. Lower leaves oblong-lanceolate, 8–12 cm long and 2–3 cm broad, covered beneath with small stellate hairs . . . . . 21. **Ph. pungens** Willd.
- + Lower leaves ovate or ovate-oblong, 7 cm long and 3.5 cm broad, covered beneath with stellate and monoradial hairs . . . . . 22. **Ph. pseudopungens** Knorr.
25. Bracts 7–9 mm long; lower leaves broadly elliptic, dentate. . . . . 24. **Ph. lencoranica** Knorr.
- + Bracts 12–15 mm long; lower leaves lanceolate, crenate. . . . . 23. **Ph. kopetdagensis** Knorr.
26. Flowers yellow or white; bracts 15–17 mm long, connate at base; verticillasters borne on peduncles 3–6 mm long . . . . . 25. **Ph. cancellata** Bge.
- + Flowers lilac or pink; bracts free . . . . . 27.
27. Bracts 12–15 mm long; lower leaves 11–12 cm long and 4–5 cm broad; upper leaves oblong-lanceolate, 6–7 cm long and 2–2.5 cm broad; calyx teeth upright . . . . . 26. **Ph. taurica** Hartwiss.
- + Bracts 10 mm long; lower leaves 13 cm long and 4–5 cm broad; upper leaves ovate-lanceolate, 7 cm long and 4–8 cm broad; calyx teeth spreading . . . . . 27. **Ph. majkopensis** (Novopokr.) Grossh.
28. Style with equal lobes . . . . . 29.
- + Style with unequal lobes . . . . . 33.
29. Nutlets glabrous at apex; filaments unappendaged; radical leaves forming a dense rosette, broad-ovate to lanceolate . . . . . 32. **Ph. tschimganica** Vved.
- + Nutlets bearded at apex . . . . . 30.
30. Filaments unappendaged; leaves ovate; upper lip of corolla half the length of the lower . . . . . 31.
- + Filaments appendaged . . . . . 32.
31. Lower leaves 7–10 cm long and 7–12 cm broad; bracts covered with multiarticulate and glandular hairs; corolla purple, 10 mm long . . . . . 29. **Ph. vavilovii** M. Pop.

- + Lower leaves 6–10 cm long and 5–10 cm broad; bracts villous with multiarticulate hairs; corolla whitish, 15–18 mm long . . . . . 31. **Ph. ferganensis** M. Pop.
- 32. Lower leaves 15–17 cm long and 15–19 cm broad; bracts subulate-linear, one-third to half the length of calyx, with simple stellate hairs . . . . . 28. **Ph. brachystegia** Bge.
- 62 + Lower leaves 12 cm long and 10 cm broad; bracts ovate or oblong-lanceolate, equaling or exceeding the calyx, gray-lanate with articulate hairs . . . . . 30. **Ph. ostrovskiana** Rgl.
- 33. Nutlets with a dense tuft of hairs . . . . . 34.
- + Nutlets glabrous or nearly so . . . . . 41.
- 34. Leaves large, 10–15 cm long and 10–12 cm broad, triangular, deeply cordate at base, glabrate above, with scattered simple hairs beneath; roots stringlike, with tuberous swellings . . . . . 40. **Ph. tuberosa** L.
- + Leaves 5–16 cm long, 3–11 mm broad, covered with stellate and long hairs . . . . . 35.
- 35. Calyx teeth including spine one-fourth to one-half the length of the tube; filaments unappendaged . . . . . 38. **Ph. oreophila** Kar. et Kir.
- + Calyx teeth short tapering, acute, 1–2 mm long; filaments with linear appendages . . . . . 36.
- 36. Radical leaves wilting at flowering time; cauline leaves triangular-ovate, crenate-serrate; bracts with stellate and monoradiate hairs . . . . . 42. **Ph. maeotica** Schost.
- + Radical leaves persistent at flowering time, triangular-ovate, crenate-dentate . . . . . 37.
- 37. Leaves with articulate hairs above, with profuse stellate hairs beneath. . . . . 43. **Ph. hypanica** Schost.
- + Leaves with simple hairs above, with profuse stellate and multiarticulate hairs below . . . . . 38.
- 38. Bracts subulate, with tubercled-setiform hairs; filaments with long linear appendages . . . . . 46. **Ph. hybrida** Zelen.
- + Bracts linear-subulate, with multiarticulate hairs; filaments with spurlike appendages . . . . . 39.
- 39. Leaves whitish beneath with copious stellate and monoradial hairs . . . . . 45. **Ph. scythica** Klok. et Schost.
- + Leaves grayish beneath with branched and stellate hairs . . . . . 40.
- 40. Bracts equaling or slightly exceeding the calyx, covered with stellate and long hairs; appendages of filaments oblong and recurved . . . . . 41. **Ph. puberula** Kryl. et Serg.
- + Bracts shorter than calyx, spinescent, covered with multiarticulate spreading hairs; appendages of filaments spurlike . . . . . 44. **Ph. agraria** Bge.
- 63 41. Nutlets completely glabrous. . . . . 42.
- + Nutlets subglabrous, with occasional or scattered hairs . . . . . 45.
- 42. Radical leaves broad-ovate, sharply serrate or dentate, sparsely hispid above, with monoradial hairs beneath; bracts broadly lanceolate, 9–10 mm long, equaling or exceeding the calyx, ciliate . . . . . 47. **Ph. maximoviczii** Rgl.
- + Radical leaves cordate-ovate or cordate, 12–17 cm long and 10–15 cm broad . . . . . 43.
- 43. Radical leaves cordate-ovate, obtusely toothed, covered above and beneath with articulate and stellate hairs; calyx teeth emarginate, short-mucronate; filaments with elongate appendages. . . . . 36. **Ph. pratensis** Kar. et Kir.
- + Radical leaves cordate, covered above and beneath with uniarticulate hairs; calyx teeth rounded-ovate, with spinous point 2–3 mm long . . . . . 44.

44. Stems glabrous or short-haired in lower part, covered above with long retrorse hairs, rarely stellate-pubescent . . . . . 33. **Ph. alpina** Pall.  
 + Stems gray with minute fasciculate-stellate hairs; radical leaves ovate, covered on both sides with small stellate and larger fasciculate-stellate hairs . . . . . 35. **Ph. tyttaster** Vved.
45. Radical leaves numerous, variable, cordate and cordate-ovate, dentate-crenate, the upper side with scattered bristly hairs, the petiole varying in length. . . . . 37. **Ph. dszumrütensis** Afan.  
 + Radical leaves uniform, cordate-ovate, covered above with stellate and small simple hairs. . . . . 46.
46. Calyx 10–12 mm long, the teeth with point 2–3 mm long; nutlets either glabrous or sparsely hairy on the same plant . . . . . 34. **Ph. canescens** Rgl.  
 + Calyx 8–10 mm long, the teeth emarginate with reclinate subulate point; some nutlets sparsely hairy. . . . . 47.
47. Leaves oblong or oblong-ovate, stellate-pubescent beneath; calyx herbaceous. . 48.  
 + Leaves ovate, subglabrous above and beneath; calyx coriaceous, the teeth broad-ovate, produced into a point 5–8 mm long . . . . . 39. **Ph. urodonta** M. Pop.
- 64 48. Leaves oblong-ovate, 10–11 mm [sic] long and 4.5 cm broad, crenate-dentate, covered above with stellate and monoradial hairs, grayish beneath with monoradial hairs. . . . . 48. **Ph. alaica** Knorr.  
 + Leaves oblong, 10–20 cm long and 4–6 cm broad, whitish-gray beneath with dense stellate tomentum, prominently netted-veined. . . . 49. **Ph. knorringtoniana** M. Pop.

Section 1. **Euphlomis** Benth. Lab. Gen. et sp. (1832–1836) 622. — Upper lip of corolla large, compressed laterally, not bearded at margin inside (if hairs occur then sparse and short); lateral lobes of lower lip small, the middle lobe large, broadly rounded.

Series 1. *Caucasicae* Knorr. — Nutlets glabrous; flowers orange or yellow; bracts free, subulate or ovate; plants floccose-hairy.

1. **Ph. fruticosa** L. Sp. pl. (1753) 818; Benth. Lab. Gen. et sp. 627 et in DC. Prodr. XII, 540; Boiss. Fl. or. IV, 784. — Ic.: Bot. Mag. XII, tab. 1843 (1816); Rchb. Ic. Fl. Germ. XVIII, tab. 1222 (1856).

Perennial, 25–45 cm high; stems woody, divaricately branched, white, floccose with closely appressed stellate hairs; lower leaves ovate, rounded-cuneate at base, the upper side grayish-green, rugose, covered with simple and stellate hairs, the lower side white-tomentose with copious monoradial hairs; petioles of lower leaves 1–2.5 cm long; upper leaves sessile; inflorescence of 1 or 2 verticillasters, these 10–15-flowered; bracts broad-ovate, closely appressed to flowers, 16–18 mm long and 3–6 mm broad, covered with simple hairs above and monoradial as well as simple hairs beneath, the margin ciliate; calyx 15–17 mm long, covered with monoradial and simple hairs; calyx teeth 3–4 mm long, broad at base, rounded at apex, with a short subulate point; flowers orange,



nearly twice as long as calyx; corolla stellate-pubescent outside; upper lip shorter than the lower, with sparse short hairs at margin inside; lower lip with broad-ovate shallowly emarginate middle lobe, the lateral lobes lanceolate; filaments appendaged at base; nutlets glabrous. June.

Introduced. — European part: Crim.; Caucasus: E. Transc. (Tbilisi area). **Gen. distr.:** Med., Bal.-As. Min. Described from Sicily. Type in London.

- 65 2. **Ph. caucasica** Reching. fil. in Oesterreich. Bot. Zeitschr. LXXXIV, 4 (1940) 257. — **Ph. orientalis** auct. fl. Cauc. — **Ph. armeniaca** auct. fl. Cauc. — **Ph. armeniaca**  $\alpha$ . *typica* Béguinot et Diratz. Contr. fl. Armen. (1912) 94, non Willd. (1800) 119. —  **Ic.:** Rech. fil. l. c. fig. 3.

Perennial, 20–63 cm high; stems solitary or several, glabrous or sparsely pubescent, more densely stellate-pubescent under nodes; radical leaves numerous, varying in shape and size, at first subspatulate, white-tomentose, 4–5 cm long and 1.5–2 cm broad, short-petioled, at length oblong-lanceolate, 7–8 cm long and 2–2.5 cm broad, on petiole 6–7 mm long, the upper side alveolate, grayish-green, covered with branched hairs, the lower side gray with copious closely appressed branched hairs; cauline leaves similar, 5–9 cm long and 2–4.5 cm broad, lanceolate to narrowly lanceolate, short-petioled, short-dentate or entire, truncate or subcordate at base; upper floral leaves as long as or slightly shorter than the whorls; inflorescence spikelike; verticillasters 6-flowered, distant, only the upper approximate; flowers sessile; bracts subulate, soft, 8–15 mm long, covered with branched hairs; calyx tubular, 10–20 mm long; calyx teeth 5, unequal, the upper 3–5 mm, the lower 7 mm long, erect, densely covered with branched hairs; corolla bright yellow, 30–40 mm long; upper lip mostly shorter than the lower, falcate, hairless at margin inside; lower lip with broadly obcordate middle lobe, the lateral lobes very short, rounded-emarginate; filaments unappendaged. June–July.

Gravelly and stony slopes. — Caucasus: S. and E. Transc., Tal. **Gen. distr.:** Iran. Described from the Caucasus, using Hohenacker's collections. Type in Vienna; cotype in Leningrad.

Series 2. *Bucharicae* Knorr. — Leaves elliptical, lanceolate or cordate-ovate; bracts connate or free; filaments always with linear or spurlike appendages; corolla yellow.

3. **Ph. bucharica** Rgl. in Tr. Bot. sada, IX (1886) 579; O. and B. Fedch. Perech. rast. Turk. V, 169. —  **Ic.:** Regel', op. cit. Plate X, 2.

- 66 Perennial, 40–60 cm high; stems branched, appressed-floccose-pubescent; leaves numerous; radical and cauline leaves elliptical, lanceolate or ovate-lanceolate, mostly entire or sparsely dentate at base, 9–13 cm long and 3–5.5 cm broad; upper leaves similar or narrowly lanceolate, smaller, gradually attenuate to broad petiole, 4.5 cm long and 8–10 mm broad, covered above with monoradial hairs, prominently veined and densely stellate-hairy beneath; petioles of radical leaves 2.5–3.5 cm long; inflorescence of 4–6 distant verticillasters, these 2–8-flowered; bracts free at base, thickish,

attenuate toward apex, appressed to flowers, half to two-thirds the length of calyx, stellate-hairy; calyx campanulate, floccose-tomentose, the teeth 2–3 mm long, equal, erect, short-acuminate; corolla yellow; upper lip straight from base to middle, slightly curved above; middle lobe of lower lip broad-ovate, truncate, the lateral lobes oblong; corolla tube covered from middle to limb with long white antrorse hairs, above with stellate and monoradial hairs; filaments pubescent in middle part, the appendages broadly spur-like; nutlets glabrous. June–August.

From high foothills to foothill plains, in grass-and-forb and in wormwood-and-grass belt, in association with ephemeral vegetation. — Centr. Asia: Pam.-Al. Endemic. Described from Gissar range. Type in Leningrad.

4. *Ph. tomentosa* Rgl. in A.P. Fedch. Putesh. in Turk. III, 18 (1882) 69; in Tr. Bot. sada, IX, 583; O. and B. Fedch. Perech. rast. Turk. V, 170.

Perennial, 40 cm high; stems floccose-tomentose with monoradial hairs; cauline leaves cordate-ovate, coarsely crenate, 14 cm long and 9 cm broad, with tomentose petiole; upper leaves compound, smaller, the upper side rugose, sparsely covered with monoradial hairs, white beneath with appressed stellate hairs; inflorescence of 4 or 5 distant 6-flowered whorls; bracts connate at base in 2's or 3's, long, sharply spinescent, 20–30 mm long, greatly exceeding the calyx, stellate-hairy; calyx broadly campanulate, 10–12 mm long, stellate-hairy, the teeth subulate from a broad base, unequal, 7–9 and 11–4 mm long respectively; corolla yellow, covered above with monoradial hairs; upper lip slightly curved at base, straight above; lower lip with ovate emarginate middle lobe, the lateral lobes oblong-elliptical; appendages of filaments broadly linear, long-villous; nutlets glabrous, tubercled. July.

Centr. Asia: Pam.-Al. Endemic. Described from W. Zeravshan. Type in Moscow; cotype in Leningrad.

- 67 Series 3. *Thapsoideae* Knorr. — Plants usually niveous-tomentose with copious stellate hairs; flowers lilac or purple; whorls 2–8-flowered, sessile or borne on stout peduncles; bracts connate or free; appendages of filaments spurlike.

5. *Ph. olgae* Rgl. in A.P. Fedch. Pytesh. in Turk. III, 18 (1882) 68; in Tr. Bot. sada, IX, 582; O. and B. Fedch. Perech. rast. Turk. V, 170. — Ic.: Regel?, op. cit. IX, Plate X, 6.

Perennial, 30–50 cm high; stems solitary or several, erect, branched in upper part, tomentose with appressed stellate hairs; cauline and lower floral leaves elliptical or ovate, cordate or rounded at base, 12–15 cm long and 5–7 cm broad; floral leaves compound, 7.5 cm long and 3.5 cm broad, all entire, scabrous above, grayish with stellate and monoradial hairs, densely niveous-tomentose beneath; whorls 3–5, distant, 4–8-flowered (rarely 2-flowered); flowers sessile; bracts broad at base, spinous-tipped, free, erect, 18–30 mm long, equaling or exceeding the calyx, white with stellate and monoradial hairs; in var. *seravschanica* bracts connate at base in 2's or 3's; calyx campanulate, expanded upward, stellate-tomentose, together with teeth 13–18 mm long,

the teeth 3–5 and 8–12 mm long, spinescent, horizontally spreading; corolla purple, equalling to half as long again as the calyx; corolla tube glabrous outside, only under the throat with a ring of monoradial hairs; upper lip with short hairs at margin inside; middle lobe of lower lip broadly ovate-rhomboid, the lateral lobes oblong-ovate; filaments with broadly linear-calcariform appendages and sparse long hairs at their base; nutlets glabrous. May–July. (Plate IV, Figure 1).

In mountain areas, dry places, mottled strata, stony slopes; in juniper woods and fescue-and-forb steppes. — Centr. Asia: Pam.-Al. Endemic. Described from Kaidar-Bulak and Tash-Kurgan (Tadzhikistan). Type in Leningrad.

6. *Ph. thapsoides* Bge. in Mém. Acad. Sc. Petersb. sav. etr. VII (1851) 440; Boiss. Fl. or. IV, 791; Regel' in Tr. Bot. sada, IX, 581; O. and B. Fedch. Perech. rast. Turk. V, 170. — Exs.: HFAM, No. 216.

Perennial, 30–60 cm high; stems stout, erect, strongly branched in upper part, 68 floccose-pubescent with stellate hairs; cauline leaves cordate-ovate, coarsely dentate, acuminate, 7–12 cm long and 3–6 cm broad; floral leaves compound, entire, 5–7 cm long and 3–3.5 cm broad, the uppermost 2.5–3 cm long and 1.5 cm broad, the upper side light green, rugose, scabrous, sparsely hairy, the lower side prominently veined, white with closely appressed monoradial hairs; petioles of cauline leaves 1.5–4 cm long, those of floral leaves 5–8 mm long; inflorescence of 5 or 6 subdistant 2–8-flowered whorls; bracts connate at base in 2's, rarely in 3's, thick, acuminate, 14–18 mm long, equalling the calyx; calyx 10–16 mm long, densely covered with hairs as on bracts, the teeth equal, acuminate; in var. *brevisubulata* M. Pop. (in herb.) calyx 11–12 mm long, with short acute teeth; corolla lilac, the tube with a ring of monoradial hairs just under the throat, sparsely pubescent above; lower lip with broad-ovate middle lobe and short oblong lateral lobes; filaments with scattered hairs in middle part, the appendages broadly oblong, calcariform; nutlets brown, glabrous, lustrous. June–August.

In foothills, grass and wormwood steppes; in Nuratau Mountains, iris and grass associations. — Centr. Asia: Pam.-Al. Endemic. Described from the vicinity of Samarkand. Type in Leningrad.

Note. *Ph. thapsoides* var. *longisubulata* is most probably a hybrid between *Ph. thapsoides* and *Ph. olgae*.

7. *Ph. spinidens* Nevski in Tr. Bot. inst. AN SSSR, ser. I, No. 4 (1937) 325.

Perennial, 50–65 cm long; stems erect, simple or branched in upper part, tomentose with stellate and monoradial hairs; radical and cauline leaves oblong-ovate or ovate-lanceolate, 7–15 cm long and 2.5–5 cm broad, acuminate, rounded-cuneate at base, subentire or sparingly denticulate; floral leaves similar, smaller, the upper side green, covered with scattered stellate and monoradial hairs, the lower side prominently veined, white, woolly with profuse closely appressed small stellate hairs; radical and cauline leaves on petiole 1–2 cm long and 5–7 mm broad; inflorescence of 4–6 distant few-flowered whorls, these sessile or borne on short stout peduncles; bracts 15–25 mm 71 long, connate at base in 2's or 3's, thick, spinescent, covered with monoradial hairs; calyx campanulate, prominently nerved, canescent with monoradial hairs, the teeth





PLATE IV. 1 – *Phlomis olgae* Rgl., part of inflorescence, flower; 2 – *Ph. salicifolia* Rgl., part of inflorescence, flower; 3, 3a – *Ph. cancellata* Bge., part of inflorescence, flower.

unequal, 3–5 and 7–10 mm long, spreading; corolla purple-rose, the tube glabrous, pubescent under the throat with stellate and monoradial hairs, above only with stellate hairs; upper lip curved, equaling the lower, short-haired at margin inside; middle lobe of lower lip broad, cordate-reniform, obtusish, the lateral lobes ovate; filaments sparsely hairy, with linear spurlike appendages; nutlets glabrous. July.

Mountain slopes, in juniper woods and needlegrass associations. — Centr. Asia: Pam.-Al. Endemic. Described from Kugitang range. Type in Leningrad.

Note. A species related to *Ph. thapsoides* Bge. and possibly a hybrid between *Ph. olgae* and *Th. thapsoides*, as suggested by A.I. Vvedenskii. We prefer to retain its independent standing, considering that Kugitang is distinguished by a high rate of endemism.

Series 4. *Nubilantes* Knorr. — Flowers cream-colored or creamy-pink; whorls always pedunculate; calyx teeth unequal; bracts connate in 2's or 3's.

8. *Ph. nubilans* Zak. in Bot. mat. gerb. Inst. bot. i zoolog. AN UzSSR IX (1947) 3. — Exs.: GRF, No. 3773.

Perennial, with a stout root; stems several, erect, branched in upper part, glabrate at base, stellate-pubescent above; radical leaves numerous, oblong-elliptical, 4–9 cm long and 3–4 cm broad; cauline leaves 5–6 cm long and 3–4 cm broad; floral leaves 1–3 cm long and 8–9 mm broad, entire; upper side of leaves coriaceous, dull or lustrous, scabrous with scattered stellate hairs; lower side white, densely and finely stellate-pubescent; petioles of lower and radical leaves 5–6 cm long; upper floral leaves on broad petiole 4–6 mm long; inflorescence of 4–6 verticillasters, the peduncles 4–6-flowered, the flowers pedicellate; bracts broadly subulate at base, point-tipped, mostly connate in 3's, more rarely in 2's, 10–13 mm long, patent, appressed at base to flowers, covered with stellate and monoradial hairs; calyx tubular-subcampanulate, prominently nerved, hairy at margin in throat, densely covered outside with stellate and monoradial hairs; calyx teeth short-triangular, terminating in a long spreading subulate point, unequal, 6–9 mm and 3–4 mm long including point; corolla creamy-pink, nearly twice the  
72 length of calyx, the tube glabrous, only just under the throat with a dense ring of monoradial hairs; upper lip erect or slightly curved, sparsely hairy at margin inside; lower lip with triangular-ovate middle lobe, the lateral lobes short, triangular-oblong, covered outside with monoradial hairs; filaments with lanceolate-calcariform appendages; stigma glabrous, with very unequal lobes; nutlets brown, glabrous. July–September.

Lower part of woodland and scrub belt, in quackgrass and forb and in shrub associations. — Centr. Asia: Pam.-Al. Endemic. So far known only from Nuratau. Type in Tashkent.

9. *Ph. tenuis* Knorr. in Bot. mat. gerb. Bot. inst. AN SSSR, XII (1950) 244.

Perennial, 20–25 cm high, with a stout multicapital root; stems erect, slender, branched in upper part, at and above base subglabrous or sparsely stellate-hairy, in upper part thinly stellate-pubescent; radical leaves ovate-oblong, acuminate, 8–9 cm long

and 2–3 cm broad; cauline and floral leaves ovate, 6–7 cm long and 2.5–4 cm broad, the uppermost smaller, all entire, the upper side olivaceous-green, covered with scattered stellate hairs, the lower side silvery-white with copious fine stellate hairs; radical leaves on petiole 7–8 cm long, the lower floral on broad petiole 1–2.5 cm long; inflorescence of 2 or 3 distant 6–8-flowered whorls; bracts broad at base, attenuate to a point, the upper connate in 2's or 3's, the lower free, 20–25 mm long, patent, greatly exceeding the calyx, densely stellate-hairy at base, sparsely so above; calyx campanulate, 10–13 mm long, densely covered from base with small monoradial hairs (with one ray 10–15 times as long as others), more sparsely toward apex; corolla creamy, one-and-a-half times as long as the calyx, the tube with a dense ring of antrorse monoradial hairs in throat sparsely pubescent above; upper lip slightly curved, shorter than the lower; lower lip with broadly reniform middle lobe and short elliptical lateral lobes; filaments hairy in middle part, with short broad reclinate appendages; stigma with unequal lobes; nutlets glabrous. July–August.

Woodland and scrub belt. — Centr. Asia: T. Sh. (W.). Endemic. Described from Tien Shan, Piazak on the slopes descending toward the river Koksū. Type in Leningrad.

73 10. *Ph. angrenica* Knorr. in Bot. mat. gerb. Bot. inst. AN SSSR, IX, 4–12 (1946) 199.

Perennial, 50–60 cm high; stems several, incurved, branched in upper part, densely stellate-hairy, subglabrous at base; lower leaves broad-ovate, coarsely crenate, subobtusely; upper cauline leaves smaller, compound; floral leaves oblong-lanceolate, undulate-margined, attenuate toward apex; upper side of leaves brownish-green, with scattered stellate and simple hairs, obscurely veined, rugose, the lower side velutinous-tomentose with monoradial hairs, the lower on petiole 2–3 cm long and 2–3 mm broad; whorls distant at base, approximate above, many-flowered; bracts mostly connate in 2's or 3's, rarely free, broad at base, attenuate toward apex, spinescent, the upper appressed to flowers, the lower recurved, 18–20 mm long, covered at base with monoradial hairs, with scattered hairs above, the teeth unequal, 3–5 mm and 7–9 mm long; corolla creamy-pink, equaling or slightly exceeding the calyx, the tube with a dense ring of antrorse monoradial hairs outside at throat, sparsely pubescent above; upper lip slightly incised; lower lip with broadly cordate middle lobe and shorter oblong lateral lobes; filaments with narrowly linear-calcariform appendages; nutlets glabrous. July.

Woodland and scrub belt, on gravelly slopes. — Centr. Asia: T. Sh. (W.). Endemic. Described from the river Arasan area. Type in Leningrad.

11. *Ph. zenaidae* Knorr. in Bot. mat. gerb. Bot. inst. AN SSSR, XII (1950) 242. — Ic.: op. cit. 243.

Perennial, 25–45 cm high, with a stout root; stems stout, erect, branched in upper part, floccose-pubescent near base, glabrous above, only under the inflorescence densely covered with monoradial hairs; radical leaves numerous, 14–19 cm long and 7–12 cm broad; cauline leaves similar, smaller, 14 cm long and 7 cm broad; lower floral leaves 10.5 cm long and 6 cm broad; all leaves subentire, only the radical sparingly and coarsely crenate toward apex; upper side of leaves stramineous-green, with scattered monoradial hairs, the lower side velutinous-white with a dense closely appressed coat of similar



hairs; petioles of lower leaves 13–15 cm long, those of floral leaves tomentose, 3.5 cm long and 3–4 mm broad; inflorescence of 2 or 3 remote short-peduncled whorls, with 12–17 flowers; bracts 20–25 mm long, connate at base in 2's or partly free, thick, the lower partly recurved, partly spreading, tomentose at base, with stellate hairs above; calyx campanulate, the tube coriaceous, 11 mm long, the teeth widely spaced, subulate, spreading, unequal, 5 and 10 mm long respectively, short-auriculate at base, densely covered with monoradial hairs; corolla creamy, twice as long as calyx, the tube with a ring of monoradial hairs outside at throat (the elongated ray of the hairs stout), sparsely pubescent above; upper lip entire, with few hairs at margin inside; lower lip with broad-ovate middle lobe and oblong lateral lobes; filaments pubescent at base, the short appendages upcurved, hairy; nutlets glabrous. June.

Foothills. — Centr. Asia: Syr D. Endemic. Described from Angren river valley. Type in Leningrad.

Series 5. *Brevipedicellatae* Knorr. — Flowers pink; verticillasters many-flowered, borne on short stout peduncles; calyx teeth unequal; bracts mostly free, acute, incurved; radical leaves long-petioled, oblong-lanceolate or cordate-oblong.

12. *Ph. fruticetorum* Gontsch. in Tr. Tadzh. bazy AN SSSR, II (1936) 186. — *Ph. salicifolia* var. *intermedia* Rgl. in Tr. Bot. sada, VI (1879) 37.

Perennial, 50–80 cm high; stems erect or more or less ascending, simple or branched in upper part, obtusely 4-angled, tomentose in upper part; radical leaves oblong-lanceolate or cordate-oblong, subcordate or rarely almost rounded at base, short-acuminate, denticulate; cauline leaves distant, more or less cordate at base, gradually attenuate toward apex, with undulate or denticulate margin; floral leaves exceeding the verticillasters, the upper side scabrous, bright green, with scattered stellate and monoradial hairs, the lower side white-tomentulose with copious stellate hairs; petioles of radical leaves 13–20 cm long; inflorescence of numerous verticillasters borne on short stout peduncles; bracts subulate, 15–17 mm long, upcurved, acute, longer than the calyx; calyx campanulate, 13 mm long, white-tomentose with monoradial hairs, the teeth subulate, unequal, the upper 5–6 mm long, the lower 10 mm long; corolla pink; upper lip 75 curved entire; middle lobe of lower lip cordate, shortly bidentate, the lateral lobes ovate-lanceolate; filaments appendaged, slightly pubescent; nutlets glabrous. June–July.

High foothills, in the woodland and scrub belt. — Centr. Asia: Pam.-Al. Endemic. Described from E. Tadzhikistan, Mount Seistan, foothills near the village of Dzhanakaly. Type in Leningrad.

13. *Ph. Sewerzowii* Rgl. in Tr. Bot. sada, VI (1879) 372. — *Ph. salicifolia* var. *Sewerzowii* Rgl. op. cit. VI (1879) 37.

Perennial, 30–45 cm high; stems numerous, slightly incurved, glabrous or slightly pubescent in lower half; radical leaves 9–11 cm long and 5–6 cm broad, ovate-elliptical or lanceolate; cauline leaves similar; all leaves distantly large-toothed or entire, the upper side green, slightly rugose, subglabrous, the lower side covered with small stellate

and simple hairs; petioles of lower leaves 5–7 cm long, those of upper leaves 10–15 mm long; whorls numerous, the lower distant, the upper approximate, many-flowered, sessile or borne on short stout branched peduncles; bracts subulate, 15–20 mm long, the lower divaricate or patent, stellate-hairy; calyx tubular-campanulate, the tube 8–10 mm long, prominently nerved, stellate-pubescent, the teeth subulate, broadly rounded at base, 3–4 and 7–8 mm long, patent; corolla pink, the tube glabrous from base nearly to throat, with a ring of white hairs in throat; corolla covered with monoradial hairs; upper lip entire or shallowly emarginate; lower lip with broadly triangular middle lobe and shorter ovate lateral lobes; filaments glabrous, the appendages short, calcariform, slightly spreading; nutlets glabrous. July–August.

Upper part of the woodlands and scrub belt, in grass and grass-and-forb steppe associations. — Centr. Asia: T. Sh. (W.). Endemic. Described from Tashkent Alatau. Type in Leningrad.

Series 6. *Salicifoliae* Knorr. — Flowers lilac, in short-peduncled semiverticels; bracts subulate, spinescent, the upper connate at base in 2's or 3's, the lower free; leaves lanceolate or linear, cuneate at base.

14. *Ph. linearifolia* Zak. in Bot. mat. gerb. Inst. bot. i zoolog. AN UzSSR, IX (1947) 3.

Perennial, 25–35 cm high; roots woody, multicapital; stems erect, simple or branched in upper part, densely stellate-hairy; radical leaves narrowly linear, entire or undulate-margined, 16–17 cm long and 5–7 mm broad; cauline leaves 8–9 cm long and 1–3.5 mm 76 broad; floral leaves resembling the cauline, the upper side with scattered stellate and monoradial hairs, the lower whitish-gray with copious appressed stellate and monoradial hairs; petioles of radical leaves 6–7 cm long, those of cauline leaves dilated, amplexicaul, 1–1.5 cm long; verticillasters remote, 4–8-flowered; bracts appressed to flowers or somewhat spreading, 15–18 mm long, stellate-pubescent, exceeding the calyx; calyx tubular-campanulate, 9–10 mm long, whitish-gray, stellate-pubescent, the teeth rounded-sinuate at base, subulate-pointed, 6–7 and 8–9 mm long; corolla lilac, covered above with monoradial hairs; upper lip erect, with sparse short hairs at margin inside; lower lip with broadly reniform middle lobe and linear lateral lobes; filaments glabrous, the appendages oblong, short, calcariform; nutlets glabrous. May–July.

Foothills, in wormwood steppes and low desert mountains, in rocky places. — Centr. Asia: Pam.-Al. Endemic. Described from Nuratau Mountains. Type in Tashkent.

15. *Ph. salicifolia* Rgl. in Tr. Bot. sada, VI (1879) 371 and IX (1886) 585; O. and B. Fedch. Perech. rast. Turk. V, 171. — *Ph. turkestanica* Bge. in Mém. Acad. Sc. Pétersb. VII sér. XXI, 1 (1873) 77–78, nomen. — *lc.*: Regel', op. cit. IX, Plate X.

Perennial, 20–50 cm high; root stout; stems numerous, erect or [?] branched, stellate-pubescent at base, almost tomentose under inflorescence; radical and lower cauline leaves lanceolate, cuneate at base, sharply dentate, rarely entire, 10–20 cm long and 3–5 cm broad; upper cauline and floral leaves similar but smaller; upper side of

leaves sparsely stellate-pubescent, the lower side grayish-tomentose with monoradial hairs; inflorescence of 6–8 flowers in short-peduncled whorls, the lower whorls distant, the upper approximate; bracts subulate, spinescent, 24–26 mm long, stellate-pubescent; calyx tubular-campanulate, covered with stellate hairs, the teeth unequal, deeply sinuate at base, with a horizontally spreading subulate spine from the notch; corolla lilac, covered outside with stellate and monoradial hairs, the tube with a ring of multiarticulate hairs from base to middle; upper lip curved, with sparse short hairs at margin inside; lower lip with broad-ovate undulate-margined middle lobe, the lateral lobes lanceolate; appendages of filaments linear, recurved; nutlets glabrous. May–August. (Plate IV, Figure 2.)

- 77 Foothill plains and low foothills, on dry slopes, in ephemeral-wormwood and grass-wormwood associations. — Centr. Asia: T. Sh., Pam.-Al. Endemic. Described from Karatau. Type in Leningrad.

Note. A highly polymorphic species, differentiated into a number of ecological forms which need more study;

var. *latifolia* Rgl. in Tr. Bot. sada, XI, 373. — Cauline leaves 10–13 cm long and 2–4 cm broad; whorls on peduncles 1–3 mm long or sessile. — In the lower mountain belt, on silty and stony slopes. — T. Sh. and Pam.-Al.

var. *pedunculata* Knorr. — Leaves lance-oblong, coarsely dentate, 15–25 cm long and 3.5–5 cm broad; bracts 17–22 mm long; whorls on peduncle 5–8 mm long; corolla 15–16 mm long; calyx tube 10–12 mm long. — Low and high foothills, in grass and grass-and-forb steppes, on light-colored serozems at transition toward dark serozems. — Pam.-Al., T. Sh. (W.).

This variety is known from the foothills of Pamiro-Alai and only one location is on record from W. Tien Shan.

var. *angustifolia* Rgl. l. c. — Radical leaves 30 cm long and 2–2.5 cm broad; cauline leaves smaller, otherwise resembling the radical; floral leaves 9–11 cm long and 1.5–2 cm broad. — In low and high foothills, on stony slopes.

This variety is distributed in Karatau and Mogoltau mountains and in the foothills of Turkestan range; it varies widely in a number of characters; leaves either broader or longer and narrower, entire or toothed; calyx teeth longer or shorter.

16. *Ph. regelii* M. Pop. in Sched. ad HFAM, VIII–IX (1926) 23. — *Ph. olgae* var. *subcrenata* Rgl. in Izv. Obshch. lyub. est. antrop. i etnogr. 23 (1882) 69.

Perennial, 30–50 cm high; stems few, tomentose; lower leaves lanceolate, 10–14 cm long, 3.5–6 cm broad; floral leaves 5–6 cm long and 2.5–3 cm broad, the upper side with scattered stellate and monoradial hairs, the lower side stellate-hairy; upper floral leaves horizontally spreading; lower leaves on petiole 4–5 cm long; inflorescence of 4 or 5 short-peduncled whorls; bracts mostly patent or reclinate, 20–25 mm long, thick at base, spinescent, exceeding the calyx, stellate-hairy; calyx tubular-campanulate, 10–11 mm long, the teeth 3.5 and 8–10 mm long, stellate-hairy; corolla lilac-pink, about as long to half as long again as the calyx; upper lip slightly curved, with sparse short projecting hairs; lower lip with broad-ovate middle lobe and oblong lateral lobes; corolla, including tube, covered with implexed stellate and monoradial hairs; filaments glabrate, the appendages calcariform-linear, bifurcate at base; nutlets subglabrous (scattered short hairs sometimes occur in certain specimens). May–July.

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Foothills, on gentle slopes, on loess soils. — Centr. Asia: Syr D. Endemic. Described from the Tashkent region. Type in Tashkent.

17. **Ph. hypoleuca** Vved. sp. n. in. Addenda XX, 646.

Perennial; stems several, erect, with upright branches, finely white-tomentose, 40–60 cm long; leaves lanceolate or linear-lanceolate, acute, elongate-cuneate at base, distant often serrulate, the upper side rugose, green, with scattered small stellate hairs intermixed with few short simple hairs, the lower side prominently veined, thinly white-tomentose, petiolate, the uppermost sessile; flowers short-pedicel, in many-flowered distant whorls in the axils of upper leaves; bracts finely subulate, stellate-puberulent, at length glabrescent, half as long again as calyx tube, often connate at base in 3's; calyx 12–14 mm long excluding teeth, finely white-stellate-tomentose, prominently ribbed, the teeth finely subulate, 6–14 mm long; corolla pinkish-lilac, stellate-tomentose outside, 25–28 mm long, the tube exerted; lower lip glabrous inside. June–July.

Silty slopes in the lower mountain zone. — Centr. Asia: T.Sh., Pam.-Al. Endemic. Described from Andizhan area. Type in Tashkent.

18. **Ph. drobovii** M. Pop. et Vved. sp. n. in Addenda XX, 646.

Perennial, 20–25 cm high; stems 1 or 2, simple, densely stellate-puberulent; radical leaves lanceolate, cuneate at base, 10–15 cm long and 2–2.5 cm broad, obscurely undulate-serrate or entire; floral leaves similar, smaller, 4–6 cm long and 1–1.5 cm broad, the upper side rugose, pale green, densely stellate-hairy, the lower side white, prominently veined, covered with small, fine stellate hairs; radical leaves on petiole 5–7 cm long, the lower floral on petiole 1 cm long; uppermost leaves subsessile, spreading or pendulous; inflorescence of few-flowered subsessile distant whorls; bracts subulate, free or connate in 2's, slightly incurved, as long as or slightly shorter than calyx, covered with small stellate and monoradial hairs (these with one ray 10 times as long as others); 79 calyx tubular-campanulate, also covered with stellate and monoradial hairs (one ray 7–10 times the length of others), the teeth short, broad, with a subulate patent point from apical notch; corolla lilac-rose, the tube slightly exerted; upper lip curved, with dense short white hairs at margin inside; lower lip flabellately 3-lobed; appendages of filaments linear, upcurved; lobes of style unequal. May.

Middle mountain zone, on stony slopes. — Centr. Asia: Syr D., Pam.-Al. Endemic. Described from Fergana valley. Type in Tashkent.

Series 7. *Betonicifoliae* Knorr. — Flowers lilac or pink; bracts free; calyx teeth short, obtuse or with a point 1–3 mm long; radical leaves oblong-elliptical or oblong, subglabrous above, stellate-pubescent beneath; whorls sessile.

19. **Ph. betonicifolia** Rgl. in Tr. Bot. sada, IX (1886) 580; O. and B. Fedch. Perech. rast. Turk. V, 171.

Perennial, 40–60 cm high; stems several, erect, simple, densely covered in lower part with stellate and monoradial hairs, sparsely pubescent above; radical leaves elliptical,

5–13 cm long and 3–5 cm broad, crenate; cauline leaves ovate-oblong, 4–5 cm long and 2–3 cm broad; floral leaves similar or oblong-elliptical, all thick, rugose and subglabrous above, niveous-tomentose beneath with stellate hairs; radical leaves on petiole 10–13 mm long, the floral on petiole 3–5 mm long; inflorescence of 2 or 3 widely distant whorls, with 10–15 sessile flowers; bracts thin, broader at base, obtuse, as long as or shorter than calyx, with stellate and monoradial hairs at base, 7–12 mm long; calyx prominently nerved, covered with stellate and monoradial hairs, the tube 10–13 mm long, the teeth unequal, subulate, spreading; corolla lilac, half as long again as calyx, with short projecting hairs at margin inside; middle lobe of lower lip broad-oval, truncate at apex, the lateral lobes short, oblong, incised; filaments pubescent with short broadly lanceolate appendages, long-haired at base; nutlets glabrous, brown, lustrous. June–July.

Red clay outcrops, precipitous stony slopes; scrub and pistacia woods. — Centr. Asia: Pam.-Al. Endemic. Described from Gissar range. Type in Leningrad.

- 80 20. *Ph. cyclodon* Knorr. in Bot. mat. gerb. Bot. inst. AN SSSR, XII (1950) 245. — Ic.: op. cit. 247.

Perennial, 45–75 cm high; rhizome stout; stems coarse, slightly incurved, simple or branched at summit, stellate-hairy; radical leaves oblong, coarsely dentate, 28–29 cm long and 5–6 cm broad; lower floral leaves 11 cm long and 3–3.5 cm broad, the upper resembling the cauline leaves, subentire, 3 cm long and 1 cm broad, the upper side rugose, scabrous, with scattered simple hairs, the lower side prominently veined, whitish-gray with copious small stellate hairs; radical and lower leaves on petiole 14–15 cm long; lower floral leaves with petiole 5–8 mm long, the upper on petiole 4–5 mm long; inflorescence of 5–8 distant 6–8-flowered whorls; bracts subulate, soft, 8–11 mm long, mostly recurved, whitish with stellate hairs; calyx cylindrical, 10–11 mm long, unevenly stellate-hairy, the teeth obtusely notched, 1–2 mm long, mostly without a point; corolla pink, half as long again as calyx, stellate-hairy above, the tube glabrous, covered under the throat with stellate and monoradial hairs; upper lip erect, with sparse long hairs at margin inside; middle lobe of lower lip broad-ovate, shallowly emarginate, the lateral lobes oblong; filaments sparsely hairy, the short broadly linear appendages bifurcate above; nutlets glabrous. May.

Gravelly-silty mountain slopes. — Centr. Asia: Pam.-Al. Endemic. Described from a mountain near river Vakhsh, close to Tut-Kaul. Type in Leningrad.

Series 8. *Pungentes* Knorr. — Flowers sessile, lilac or pink; bracts equaling or exceeding the calyx; calyx teeth triangular-subulate; leaves ovate-oblong, oblong-lanceolate or lanceolate.

21. *Ph. pungens* Willd. Sp. pl. III (1800) 121; M. B. Fl. taur.-cauc. II, 55; Benth. Lab., Gen. et sp. 631; Ldb. Fl. Ross, III, 436; Grossg. Fl. Kavk. III, 302; Fl. Yugo-Vost. VI, 150. — Ph. herba-venti auct. non L.: Boiss. Fl. or. IV (1876) 791; O. et B. Fedtsch. Perech. rast. Turk. V (1913) 170. — Ph. herba-venti var. *pungens* Schmalh. Fl. II (1897) 343. — Ic.: Fl. Yugo-Vost. VI, 150.

Perennial, 30–55 cm high; stems simple, profusely covered with stellate and multi-articulate hairs, in upper part the hairs implexed; lower leaves oblong-lanceolate, 8–12 cm long and 2–3 cm broad, coarsely crenate; cauline leaves narrowly lanceolate, 5.5 cm long and 1.5–2 cm broad; cauline and floral leaves crenate-serrate, the upper  
81 resembling the cauline, smaller, entire, the upper side green, lustrous, glabrous or with monoradial and simple hairs, the lower side grayish-green, covered with small stellate hairs; lower leaves on petiole 4–6 cm long; cauline leaves short-petioled; inflorescence of 3 or 4 widely distant few-flowered whorls; flowers sessile; bracts linear-subulate, free, acute, exceeding the calyx, covered with small stellate and monoradial or with simple multiarticulate hairs; calyx prominently nerved, covered with stellate and sparse monoradial hairs; calyx teeth subulate, unequal, patent, sparsely stellate-hairy and ciliate; corolla lilac; upper lip entire; lower lip with broad middle lobe and short tooth-like lateral lobes; tube with stellate and monoradial hairs outside, in upper part only stellate-hairy; filaments pubescent in middle part, the appendages broadly linear, recurved; nutlets glabrous. May–August.

Low foothills, gullies, dry steppes, scrub. — European part: U. Dnp., M. Dnp., V.-Don, Transv., Bes., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., E. and S. Transc.; Centr. Asia: Ar.-Casp. **Gen. distr.:** Bal.-As. Min., Arm.-Kurd., Iran. Described from Armenia? Type in London.

Note. Linnaeus described *Phlomis herba-venti* from specimens grown in the Uppsala garden from seeds received from southern France (Narbonne). There were probably specimens from "Tataria and Persia:" in the Uppsala herbarium and Linnaeus obviously thought that they belonged to the same species as the Narbonne plants. He was, however, mistaken as these are different species. In any case, the name *Phlomis herba-venti* belongs properly to the plants from the south of France, while the Russian specimens should be referred to *Ph. pungens*. As regards the Iranian plants, they may be of *Ph. taurica* affiliation.

22. *Ph. pseudopungens* Knorr. sp. n. in Addenda XX, 647. — *Ph. herba-venti* var. *tomentosa* Boiss. Fl. or. IV (1876) 791.

Perennial, 30–75 cm high; stems tough, divaricately branched in upper half, covered in lower half with long thick multiarticulate, both "simple" and "stellate" hairs, with only stellate hairs above; radical leaves ovate or ovate-oblong, 7 cm long and 3.5 cm broad, almost rounded at base; cauline leaves resembling the cauline, 10.5 cm long and 3.5 cm broad, attenuate toward apex, obtusish; floral leaves oblong; all leaves crenate, the upper smaller, entire or barely crenate; upper side rugose, rough, glabrous or with  
82 scattered small monoradial and simple hairs, the lower side densely covered with monoradial hairs; verticillasters 5–8, distant below, approximate above, 8–12-flowered; bracts appressed to calyx, slightly incurved in middle part, equaling or exceeding the calyx, 11–12 mm long, covered with 2–4-jointed and stellate hairs borne on tubercles; calyx campanulate, 8–9 mm long, prominently nerved, covered with stellate and monoradial hairs (these with a very thick elongated ray) mostly on the nerves; calyx teeth unequal (3–5 mm), subpatent, covered at base with stellate hairs and ciliate; corolla pinkish-violet, the tube covered outside in lower part with monoradial and inequiradial hairs; upper lip entire; lower lip with obovate middle lobe and broadly lanceolate



lateral lobes; filaments pubescent, the appendages linear-lanceolate, recurved; nutlets glabrous. June—July.

Mountain steppes and scrub. — Caucasus: S. and E. Transc. Endemic? Described from Armenia. Type in Leningrad.

Note. An exceedingly polymorphic species, distinguishable from *Ph. pungens* by its broad leaves and by the indument of calyx and its teeth.

23. ***Ph. kopetdagensis*** Knorr. in Bot. mat. gerb. inst. AN SSSR, XII (1950) 248.

Perennial, 30–70 cm high, divaricately branched nearly from base; stems covered in lower half with stellate hairs, in upper half stellate-puberulent; lower leaves lanceolate, obtusish, crenate, 10–14 cm long and 5–7 cm broad; cauline and lower floral leaves broadly lanceolate, 10 cm long and 2.5 cm broad; upper floral leaves oblong-lanceolate, 4–5 cm long and 5–6 mm broad, crenate, the uppermost entire; upper side of leaves light green, mostly covered beneath with monoradial hairs, the long ray of these slender; lower leaves on petiole 4–6 cm long; cauline and floral leaves on petiole 1–2 mm long; verticillasters 3 or 4, short-peduncled, 6–8-flowered; bracts subulate, 12–15 mm long, connate at base in 2's or 3's, covered with monoradial hairs (the long ray 5 times the length of others), equaling or exceeding calyx, the upper appressed to calyx, the lower spreading; calyx campanulate, prominently nerved, covered with monoradial hairs; calyx teeth unequal, subulate, 4–5 mm long; corolla pink, the tube covered outside at base with monoradial retrorse hairs; upper lip incised at apex; middle lobe of  
83 lower lip broad-oval, shallowly emarginate, the lateral lobes lanceolate; filaments pubescent in middle part, the appendages small, oblong-lanceolate. June—July.

Mountains, on steppe slopes. — Centr. Asia: Mtn. Turkm. Endemic. Described from Karakala area, Khazar Mts. Type in Leningrad.

24. ***Ph. lenkoranica*** Knorr. in Bot. mat. gerb. Bot. inst. AN SSSR, XII (1950) 249.

Perennial, 50–65 cm high; stems solitary, branched in upper part, covered with monoradial hairs, densely leafy; radical leaves broad-ovate, dentate, 11 cm long and 3.5 cm broad; cauline leaves similar, 8–9 cm long and 2.5–3 cm broad; upper leaves smaller, entire, obtusish; upper side rugose, light green, sparsely stellate-hairy; lower side white with monoradial and regular stellate hairs; lower leaves on petiole 1–2 cm long; upper cauline leaves on petiole 3–5 mm long or sessile; verticillasters 2 or 3, distant, 6–8-flowered; bracts subulate, 7–9 mm long, connate at base in 3's rarely in 2's somewhat spreading, covered with monoradial hairs (the elongated ray 10–15 times the length of others); calyx 8–9 mm long, campanulate, prominently nerved, stellate-hairy, with multiarticulate often tubercle-based multiarticulate hairs on the nerves; calyx teeth 3 and 8 mm long, subulate, spreading; corolla pink; upper lip incised; lower lip with broad-ovate middle lobe and lanceolate lateral lobes; corolla tube densely covered from base with monoradial hairs, sparsely hairy above; nutlets glabrous. July.

Foothills. — Caucasus: Tal. Described from stations Lirik and Molyaneran'. Type in Leningrad.

Series 9. *Cancellatae* Knorr. — Flowers yellow or white, borne in crotches in peduncled semiverticels; bracts subulate, connate at base in 2's or 3's; leaves oblong or oblong-lanceolate.

25. *Ph. cancellata* Bge. in Mém. Acad. Sc. Pétersb. VII sér. XXI, 1 (1873) 76; Boiss. Fl. or. IV, 789; Grossg. Fl. Kavk. III, 302. — *Ph. anisodonta* auct. non Boiss.: Fedch. Rast. Turk. (1915) 678.

84 Perennial, 20–30 cm high; stems several, erect, branched in upper part, unevenly covered with small stellate hairs; lower leaves oblong, subobtuse, 7–11 cm long and 2–4 cm broad; upper leaves oblong-lanceolate, 7–8 cm long and 1.5 cm broad; all leaves coarsely dentate, the uppermost often entire; upper side of leaves olivaceous-green, rugose, prominently veined, with scattered stellate and monoradial hairs; lower side white with copious fine appressed stellate hairs; lower and upper leaves on petiole 1–1.5 cm long; verticillasters 5–7, distant, approximate toward summit, 6–8-flowered, on peduncle 3–6 mm long; bracts 15–17 mm long, subulate, connate at base in 2's or 3's, equaling or exceeding the calyx, covered with monoradial hairs, these with a stout and very long ray; calyx 9–11 mm long, prominently nerved, the teeth spreading, 5 and 10 mm long; corolla yellow or white, one-third as long again as calyx, covered with monoradial hairs; upper lip as long as or slightly longer than the lower, densely short-bearded at margin inside; lower lip with elongated broadly ovate middle lobe and shorter broadly lanceolate lateral lobes; corolla tube glabrous at base, covered under throat with stellate and monoradial hairs; filament hairy in middle part, the appendages calcariform, broadly linear; nutlets bearded. May–June. (Plate IV, Figure 3).

Dry stony places in foothills. — Caucasus: S. Transc. (Ordubad); Centr. Asia: Mtn. Turkmen. **Gen. distr.:** Iran. Described from Shakhруд area. Type in Leningrad.

Series 10. *Tauricae* Knorr. — Flowers pink, sessile; bracts free; lower leaves ovate-lanceolate or oblong-lanceolate.

26. *Ph. taurica* Hartwiss. ex Bunge in Mém. Acad. Sc. Pétersb. VII sér. XXI, 1 (1873), 77; Trautf. in Tr. Bot. sada, IX, 111; Novopokr. in Uch. zap. Biolog. inst. Rost. univ. I (1938) 9. — *Ph. pungens* auct. quoad plantas e Tauria et prov. Novorossijsk, non Willd. — *Ph. herbaventi* f. *euxina* Wassiljew in Zap. Nikitsk. bot. sada, XI, 2 (1930) 63.

Perennial, 40–50 cm high; stems divaricately branched, covered in lower part with stellate and multiarticulate hairs, in upper part only stellate-hairy; lower cauline leaves ovate-lanceolate, 11–12 cm long and 4–5 cm broad, the upper oblong-lanceolate, 6–7 cm long and 2–2.5 cm broad; all leaves coarsely dentate, the uppermost somewhat crenate; upper side of leaves scabrous with scattered simple and stellate hairs; lower side grayish-green with rather copious small stellate hairs and few monoradial hairs; petioles of lower leaves 4 cm long, those of upper leaves 1–2 mm long; inflorescence of 3 or 4 distant 8–12-flowered whorls; bracts appressed to calyx, 12–15 mm long,

85 covered with monoradial hairs; calyx obconical, the tube covered with monoradial hairs (elongated ray 10–15 times as long as others), the nerves beset with simple multiarticulate tubercle-based hairs; calyx teeth subulate, 6–7 mm long, erect; corolla pink, exceeding the calyx, the tube covered with stellate and monoradial hairs; upper lip entire; lower lip with broadly rounded middle lobe and oblong lateral lobes; filaments pubescent, with short calcariform appendages; nutlets white-bearded at apex. June–August.

Stony slopes, in scrub. — European part: Crim.; Caucasus: W. Transc. (Novorossisk). Described from Crimea. Type in Nikita botanical garden.

27. **Ph. majkopensis** (Novopokr.) Grossh. in *Opred. rast. Kavk.* (1949) 335. — **Ph. taurica** ssp. **majkopensis** Novopokr. in *Uch. zap. Biolog. inst. Rost. univ.* I (1938) 9.

Perennial, 40–50 cm high; stems divaricately branched in upper part, covered at base with long simple and fascicled hairs (stellate with ascending rays), densely stellate-tomentose above; lower cauline leaves ovate to ovate-lanceolate, 13 cm long and 4.5 cm broad; upper leaves ovate-lanceolate, 7 cm long and 4–8 cm broad, acuminate; all leaves crenate; upper side scabrous with scattered fascicled and simple hairs, grayish beneath, prominently veined, covered with stellate and fascicled hairs; lower petioles 3.5 cm long, the upper winged, 3–4 mm long; verticillasters 3 or 4, widely distant, 8–12-flowered; bracts subulate, 10 mm long, covered with long spreading multiarticulate hairs; calyx obconical, the tube 8–9 mm long, covered with stellate and multiarticulate as well as simple hairs; teeth subulate-pointed, 5–6 mm long, spreading; corolla pink, covered with stellate and fascicled hairs; upper lip incurved, the margin short-haired; lower lip with broad-ovate middle lobe and short-lateral lobes; nutlets white-haired above. May–July.

Dry stony soils, in open woodland. — Caucasus: Cisc. Endemic. Described from Maikop area. Type in Rostov.

Section 2. **Phlomoides** (Moench) Briq. in *Pflanzenfam.* IV, 3a (1895) 248. — **Phlomoides** Moench, *Meth. pl.* (1794) 403. — **Phlomidopsis** Link, *Hand.* (1829) 479. — Upper lip of corolla hooded, not compressed laterally, densely bearded at margin inside; lateral lobes of lower lip scarcely shorter than the middle lobe, obtuse.

86 Subsection 1. *Isostyleae* M. Pop. in *Byull. Sredneaz. univ.* 13 (1926) 131. — Style with equal lobes; nutlets bearded at apex or glabrous.

Series 1. *Brachystegiae* Knorr. — Radical leaves cordate or ovate, crenate or dentate, subglabrous; calyx teeth with denticles at base; nutlets with hairs.

28. **Ph. brachystegia** Bge. in *Mém. Acad. Sc. Pétersb.* VII sér. XXI, 1 (1873) 77; Popov, op. cit. 137.



Perennial, to 100 cm high; root stout; stems glabrous, in upper part violet-tinged and more slender, flexible, divaricately branched; radical leaves 13–17 cm long and 15–19 cm broad, broad-ovate, cordate or rounded-ovate at base, crenate-dentate, subglabrous; petioles of radical leaves 20–30 cm, those of cauline leaves 4–6 cm long; verticillasters many-flowered, very distant; flowers sessile; bracts subulate-linear, one-third to half the length of the calyx-tube; calyx campanulate, 8–10 mm long, grayish with simple and stellate hairs; calyx teeth broad, notched at apex, with a short rigid point from the notch, flanked with small auricles; corolla small, lilac, villous outside with long hairs, the tube glabrous; upper lip shorter than the lower, shallowly emarginate, rounded or bidentate, densely short-bearded at margin inside; lower lip with broadly obovate middle lobe and ovate lateral lobes; filaments and style included in corolla; lobes of stigma equal; appendages of filaments slightly curved; nutlets long-bearded at apex. June–July. (Plate V, Figure 1.)

At the upper limit of the woodland and scrub zone and in the subalpine zone, on gravelly slopes. — Centr. Asia: T.Sh. (W.). Endemic. Described from Tashkent Alatau. Type in Paris.

29. *Ph. vavilovii* M. Pop. in Byull. Sredneaz. univ. 13 (1926) 129. — Ic.: op. cit. Fig. VIII.

Perennial, 40–60 cm high; rhizome stout, multicapital, tomentose-lanate at the root collar; stems solitary, erect, divaricately branched near summit, silky-lanate at base, 89 often glabrous in middle part, glandular-pubescent in upper part; radical and lower cauline leaves 7–10 cm long and 7–12 cm broad, deeply cordate at base, the margin doubly crenate; cauline leaves few, ovate; lower floral leaves oblong, attenuate at base, dentate above, exceeding the whorls; upper floral leaves equaling the whorls, entire, coriaceous, both leaf sides subglabrous, puberulent only on veins; petioles of radical leaves 7–10 cm long, those of upper leaves 3–4 cm long; floral leaves sessile; inflorescence many-flowered, with widely spaced whorls; bracts linear or linear-subulate, acuminate, firm, covered with multiarticulate and glandular hairs, as long as or slightly shorter than calyx tube; calyx tubular-campanulate, 12 mm long, densely covered with multiarticulate and glandular as well as bristly hairs; calyx teeth 5–7 mm and 3–3.5 mm long, with a broad base, subulate-pointed, with small herbaceous auricles at base; corolla purple, 10 mm long; upper lip half the length of the lower, villous outside, densely bearded at margin inside; lower lip broadly infundibular, dentate-margined, the middle lobe transversely oval, the lateral lobes slightly smaller, ovate; filaments unappendaged, the posterior longer; style exserted; lobes of stigma equal; nutlets densely long-bearded at apex. June–August.

Subalpine zone, in scrub. — Centr. Asia: T.Sh. (W.). Endemic. Described from Uch-Bulak in the Kirgiz range. Type in Tashkent.

30. *Ph. ostrovskiana* Rgl. in Tr. Bot. sada, IX (1886) 595; O. and B. Fedch. Perech. rast. Turk. V, 172; M. Pop. in Byull. Sredneaz. univ. 13, 131. — Ic.: Regel', op. cit. Plate X, Fig. 7.

Perennial, 60–90 cm high; radical buds silky-lanate; stems simple, pubescent from base to middle, glabrous above, only under inflorescence with silky hairs; radical leaves



PLATE V. 1 – *Phlomis brachystegia* Bge., radical leaf, upper part of inflorescence, flower;  
 2 – *Ph. ostrovschiana* Rgl., lower part of plant, inflorescence, flower.

ovate or cordate-orbicular, 12 cm long and 10 cm broad; cauline leaves oblong-ovate; all leaves coarsely and doubly dentate; floral leaves ovate or oblong-lanceolate, dentate, at apex entire, as long as or slightly shorter than the whorls; upper side of leaves with scattered simple hairs; lower side prominently veined, short-haired (in var. *sublanata* Rgl. grayish, thinly white-lanate with long fine silky hairs); petioles of radical leaves 13–15 cm long, those of cauline leaves 4–5 cm long; floral leaves sessile; inflorescence long, with 6–8 widely spaced whorls, only the upper approximate; bracts flat, ovate or oblong-lanceolate, as long as or longer than calyx, grayish-lanate with short and long articulate hairs; calyx rigid, tubular-campanulate, with fine long white hairs in throat; calyx teeth triangular at base, terminating in a short rigid spine, this one-fourth to one-third the length of the tube; corolla pale lilac, half as long again as calyx; upper lip emarginate, densely bearded at margin inside, densely covered outside with long hairs; lower lip with broadly rounded middle lobe and ovate toothed-margined lateral lobes; filaments exserted, with oblong calcariform appendages; lobes of stigma equal; nutlets long-bearded at apex. June–August. (Plate V, Figure 2.)

Upper part of forest-steppe belt, in scrub, in juniper woods and herbaceous meadow associations. — Centr. Asia: T.Sh. Endemic. Described from Chimgan. Type in Leningrad.

31. *Ph. ferganensis* M. Pop. in Nov. Mem. Mosk. obshch. isp. prir. XIX (1940) 40.

Perennial, to 80 cm high; stems erect, subterete-tetragonal, densely villous in lower part of inflorescence; radical leaves ovate, cordate at base, doubly crenate; cauline leaves 1 pair, ovate-oblong, dentate; floral leaves oblong, subglabrous on both sides; radical leaves on petiole to 15 cm long; cauline leaves short-petioled; verticillasters many-flowered, distant, the upper approximate; bracts subulate-linear, slightly shorter than calyx, densely covered with long hairs, villous; calyx 12 mm long, tubular, covered with long soft hairs; calyx teeth short, notched, with a spiny aristate point from the notch (1.5–2 mm long), with acute auricles at base; corolla whitish, 15–18 mm long including tube; calyx tube not exserted; upper lip half the length of the lower, densely bearded at margin inside; lower lip larger, infundibular, the middle lobe larger than the lateral; filaments unappendaged; nutlets hairy at apex. July–August.

Juniper woods. — Centr. Asia: T.Sh. (W.). Endemic. Described from Chatkal range, Gava river basin, Stu-Kul'. Type in Leningrad.

Series 2. *Tschimganicae* Knorr. — Radical leaves broad-ovate to broadly lanceolate, crenate-dentate, densely covered above with multicellular hairs, stellate-hairy beneath; nutlets glabrous at apex.

32. *Ph. tschimganica* Vved. sp. n. in Addenda XX, 647.

91 Perennial; stems 2, relatively slender, slightly flexuous, obscurely 4-angled, 45–50 cm long, covered with short and somewhat longer retrorse flattened hairs, in upper part also with stellate hairs, these with enlarged flattened flexuous central ray; radical leaves profusely rosulate, broad-ovate with cordate base to lanceolate with truncate base,



acute, coarsely crenate-dentate, the upper side somewhat prominently veined, the veins sparsely covered with simple multicellular hairs, the lower side lighter-colored, prominently veined, sparsely covered with stellate hairs and some larger hairs with a strongly enlarged central ray, the petiole half as long again as the blade, covered with stellate and some simple retrorse hairs; cauline leaves 1 pair, oblong-lanceolate, truncate at base, relatively short-petioled, otherwise resembling the radical; floral leaves much smaller, lanceolate, long-tapering at apex, very acute, entire, sessile, twice to three times as long as flowers; flowers sessile; verticillaster 2- to many-flowered, distant; bracts subulate-linear, densely covered with stellate hairs with a much elongated flexuous central ray, about equaling the calyx; calyx 12 mm long excluding teeth, lanate with very profuse small stellate flowers and some with very elongated flexuous central ray; calyx teeth semiobicular-triangular, abruptly terminating in a patent subulate point 4–5 mm long and covered with similar hairs; corolla ca. 20 mm long (23 mm when spread out), apparently lilac; tube ca. 10 mm long, with an oblique ring of hairs inside at base, glabrous outside in lower half, the limb long-haired outside (due to the long central rays); upper lip long-haired inside, with fringed margin; lower lip 3-lobed, equaling the upper, the middle lobe suborbicular, toothed; stamens converging under upper lip, unappendaged, the upper shorter, with slightly villous filaments; lobes of style equal; ovary glabrous at apex. July.

Middle mountain zone. — Centr. Asia: T. Sh. (Bol'shoi Chimgan). Endemic. Described from Chimgan. Type in Tashkent.

Subsection 2. *Anisostyleae* M. Pop. in Byull. Sredneaz. univ. 13 (1926) 131. — Stigma with unequal lobes; nutlets mostly hairy at apex, rarely glabrous.

Series 3. *Alpinae* Knorr. — Radical leaves cordate, with rounded teeth, covered on both sides with simple hairs; nutlets hairy at apex.

- 92 33. *Ph. alpina* Pall. in Acta Acad. Petrop. II (1779) 265; Bge. in Ldb. Fl. alt. II, 413; Benth. Lab. Gen. et sp. 632 et in DC. Prodr. XII, 544; Ldb. Fl. Ross. III, 438; Regel' in Tr. Bot. sada, IX, 583; Kryl. Fl. Zap. Sib. IX, 2344. — Ic.: Pall. l. c. tab. XIII and Regel', op. cit. Plate X.

Perennial, 20–50 cm high, with stringlike roots; stems solitary or several, erect, unbranched, glabrous or short-haired in lower part, covered above with long soft retrorse hairs or stellate-hairy; radical and lower cauline leaves cordate, the radical 13–15 cm long and 10 cm broad, the cauline 10 cm long and 3–4 cm broad; lower floral leaves ovate-oblong or oblong-lanceolate, 7–11 cm long and 2–4 cm broad, with rounded teeth; upper floral leaves linear-lanceolate, with obtuse teeth or entire; floral leaves greatly exceeding the whorls, covered on both sides with scattered 1-jointed hairs; petioles of radical and lower cauline leaves longer than blade; upper cauline leaves short-petioled; inflorescence many-flowered, the lower whorls distant, the upper approximate; bracts 9–11 mm long, slightly incurved, narrowly linear, clothed with long

spreading multiarticulate hairs; calyx campanulate, covered with small fine hairs often intermixed with longer multiarticulate hairs, sparsely pubescent in lower part; calyx teeth rounded-ovate, terminating in a subulate point 2–3 mm long; corolla pink, twice as long as calyx, covered outside with multiarticulate and inequatorial hairs, the tube glabrous; upper lip unevenly sharp-toothed at apex, bearded at margin inside; middle lobe of lower lip broadly rounded, the lateral lobes oblong, rounded at apex; filaments included in corolla, with short calcariform appendages; lobes of stigma unequal; nutlets hairy at apex. June–August.

Alpine and forest zones, in meadows. — W. Siberia: Alt.; Centr. Asia: Dzu.-Tarb. **Gen. distr.:** Dzu.-Kash. (Kul'dzha). Described from S. Altai. Type in Leningrad.

Series 4. *Canescentes* Knorr. — Radical leaves ovate or cordate-ovate, crenate or dentate, mostly covered on one side or on both with stellate hairs; nutlets glabrous or sparsely hairy.

34. *Ph. canescens* Rgl. in Tr. Bot. sada, IX (1886) 582; Popov in Byull. Sredneaz. univ. 13, 138. — Exs.: GRF, No. 3772.

93 Perennial, 50–75 cm high; stems several, covered with fascicled stellate hairs and with scattered multiarticulate hairs (with few or many joints); radical leaves cordate-ovate, obtusish, 11–16 cm long and 5–7.5 cm broad; cauline leaves similar, 8 cm long and 6 cm broad; floral leaves oblong-ovate, acuminate, 7 cm long and 3–4 mm broad, all obtusish, all except the uppermost covered above with small stellate hairs, densely covered beneath with stellate, inequatorial and monoradial hairs; petioles of radical leaves 15–25 cm long, those of cauline leaves dilated at base, 2–4 cm long; floral leaves on petiole 3–5 mm long or sessile; calyx covered with fascicled stellate hairs; verticillaster many-flowered, short-peduncled, remote or approximate; bracts filiform-subulate, 10–17 mm long, connate at base in 2's or free, covered with stellate, monoradial and long simple hairs; calyx tubular-campanulate, 10–12 mm long, the teeth notched or rounded, with a point 2–3 mm long, covered with stellate and monoradial hairs; corolla twice as long as calyx, lilac; upper lip with sharp uneven teeth at margin, densely bearded inside; middle lobe of lower lip rounded-oblong, emarginate, the lateral lobes broadly oblong, short; corolla covered outside above the throat with multiarticulate and monoradial hairs, the tube glabrous; filaments included in corolla, hairy, with elongated appendages; stigma with unequal lobes; nutlets glabrous or with sparse short hairs at apex. June–August. (Plate VI, Figure 3.)

Upper part of forest-steppe and subalpine zones, on stony slopes. — Centr. Asia: Pam.-Al. Endemic. Described from the Lake Iskander-Kul' area. Type in Leningrad.

35. *Ph. tythaster* Vved. sp. n. in Addenda XX, 648.

Perennial; stems 2 or 3, sturdy, erect, simple, gray with very small fascicled-stellate hairs, with 1 or 2 pairs of leaves, 40–50 cm long; radical leaves ovate, sometimes large, subacute, cordate at base, crenate, the upper side green, with somewhat impressed veins, rather densely covered with very small stellate and larger fascicled-stellate hairs, these

with a longer thick spreading central ray, the lower side prominently veined, gray with stellate and fascicled-stellate hairs, the petioles about the length of blade, with indument as on stems; cauline leaves on shorter petiole, otherwise resembling the radical; floral  
94 leaves gradually smaller, the lower with very short petiole, the upper sessile; flowers short-pedicelled in 1 to 3 few-flowered distant whorls; bracts linear-subulate, two-thirds as long to nearly as long as the calyx, covered with small stellate hairs, some of these with a longer slender central ray; calyx 12–13 mm long, gray with very small stellate and larger fascicled-stellate hairs; calyx teeth very short, nearly quadrangular, the mid-nerve excurrent into a cusp 1–2 mm long; corolla apparently pink, 21–22 mm long, stellate-hairy outside, the tube glabrous outside in lower part, with an oblique ring of hairs at base inside; upper lip with dense long hairs inside; lower lip 3-lobed, the middle lobe small, suborbicular (?); stamens with calcariform appendages; style with markedly unequal lobes; nutlets glabrous. July.

Stony slopes in the middle mountain zone. — Centr. Asia: Pam.-Al. Endemic. Described from Alai range. Type in Tashkent.

36. *Ph. pratensis* Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 426; Ldb. Fl. Ross. III, 438; Benth. in DC. Prodr. XII, 544; Regel' in Tr. Bot. sada, IX, 590; Popov in Byull. Sredneaz. univ. 13, 137.

Perennial; stems solitary or several, simple below, branched above, covered in lower part and under inflorescence with long hairs, these sometimes interspersed with stellate hairs, in middle part with simple and stellate hairs, or stems glabrous; radical and lower cauline leaves 12–17 cm long and 10–15 cm broad, cordate-ovate, obtusely toothed; cauline leaves similar, smaller; upper floral leaves ovate-oblong, with rounded or acute teeth, the uppermost entire; upper side of leaves covered with simple and stellate hairs, the lower side with long multiarticulate hairs on the veins, with scattered stellate and simple hairs between them (in f. *glabra* Knorr. leaves glabrous beneath, with simple hairs on the veins); radical and lower cauline leaves on petiole 10–20 cm long, the cauline on petiole 1–3 cm long; floral leaves sessile; inflorescence long, many-flowered, the whorls on short or elongated peduncles; bracts connate, thickish, 8–11 mm long, linear-subulate, as long as or shorter than calyx, covered with stellate and fascicled hairs; calyx tubular, 10–12 mm long, the thick nerves with simple and monoradial hairs; calyx teeth notched, with point 1.5–2 mm long from the notch; corolla pink, one-and-a-half to twice as long as calyx, covered outside with long hairs, the tube glabrous; upper lip unevenly sharp-toothed, densely bearded at margin inside; lower lip with  
95 broadly obovate middle lobe and short lateral lobes; filaments with elongated appendages; anthers exerted; nutlets glabrous. July–August.

Mountains, in the woodland and scrub zone. — Centr. Asia: Dzu-Tarb., T. Sh. **Gen. distr.:** Dzu-Kash. Described from Dzungarian Alatau. Type in Leningrad.

37. *Ph. dszumrutensis* Afan. in Bot. mat. gerb. Bot. inst. AN SSSR, VIII (1940) 110. — **Ic.:** op. cit.

Perennial, 50–56 cm high; stems few, simple, pubescent; radical leaves numerous, some on petiole 6–8 cm long, cordate-ovate, 5.5 cm long and 2–2.5 cm broad, others on dilated petiole 18–20 cm long, cordate, 7–9 cm long and 10 cm broad, subobtusely,



dentate-crenate; cauline leaves on petiole 2–2.5 cm long, ovate or ovate-triangular, 3.5–6 cm long and 3–4 cm broad, subcordate at base; lower floral leaves subsessile or short-petioled, ovate, the upper lanceolate, 4 cm long and 6 mm broad, dentate, the uppermost still narrower, entire, exceeding the whorls; upper side of leaves with scattered bristly hairs, the lower side with scattered fascicled, monoradial and 2-jointed hairs; inflorescence of 3 many-flowered distant whorls; bracts slightly curved, filiform-subulate, soft, 10–13 mm long, equaling or shorter than calyx, sparsely covered with long fine hairs; calyx tubular-campanulate, 13–15 mm long, with small stellate hairs in upper part and on nerves, the teeth semiorbicular, short-acuminate; corolla lilac, with glabrous tube; upper lip densely covered outside with multiarticulate hairs, diffusely pubescent near the throat, long-bearded at margin inside, toothed; lower lip equaling the upper, the middle lobe broad-ovate, sinuate-dentate at apex, the lateral lobes shorter, rounded-ovate; filaments included in corolla, with short linear appendages at base; lobes of stigma unequal; nutlets with short scattered hairs at apex. July.

Mountains, 2700 m above sea level, in upper part of the forest-steppe zone, in juniper woods, on stony slopes. — Centr. Asia: Pam.-Al. Endemic. Described from the northern slope of Turkestan range. Type in Leningrad.

38. **Ph. oreophila** Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 426; Benth. in DC. Prodr. XII, 544; Ldb. Fl. Ross. III, 438; Regel' in Tr. Bot. sada, IX, 588; O. and B. Fedch. Perech. rast. Turk. V, 171; Popov in Byull. Sredneaz. univ. 13, 132; Kryl. Fl. Zap. Sib. IX, 2343.

- 96 Perennial, 30–80 cm high, with stringlike roots; stems few, erect, covered in lower part with simple, in upper part with fascicled hairs; radical leaves ovate, acuminate, obtusely toothed, 9–11 cm long and 7.5 cm broad; cauline leaves similar, smaller, 6.5 cm long and 4.5 cm broad; floral leaves ovate-lanceolate or lance-linear, 4–6 cm long and 0.5–2 cm broad, the upper narrow, entire, exceeding the whorls; upper side of leaves with scattered simple hairs, the lower side densely beset on the veins with stellate and fascicled hairs, between the veins with sparse simple hairs, radical leaves on petiole 12–14 cm long, the length of blade; floral leaves sessile; verticillasters many-flowered, the upper approximate; bracts thin, 10–13 mm long, filiform-subulate, covered with fine long spreading hairs, sometimes also with glandular hairs; calyx covered with stellate and simple long hairs, densely so on the nerves, the teeth deeply notched, broad-ovate or rounded, subulate-acuminate, with a point 2–2.5 mm long; corolla lilac, twice as long as calyx, covered outside under the throat with few- and many-jointed hairs, the tube glabrous; upper lip densely bearded at margin inside, unevenly toothed; lower lip with elongate obovate middle lobe and broad-ovate lateral lobes; filaments included in corolla tube, almost unappendaged or with rudimentary appendages; stigma lobes unequal; nutlets hairy at apex. June–August. (Plate VI, Figure 1.)

From the forest-steppe and forest zones up to the subalpine zone, on stony slopes.— W. Siberia: Alt.; Centr. Asia: Dzu.-Tarb., Pam.-Al., T. Sh. **Gen. distr.:** Mong. Described from Dzungarian Alatau. Type in Leningrad.

**Economic importance.** According to information supplied by M.M. Sovetkina, this species is of value in pasture.



PLATE VI. 1 — *Phlomis oreophila* Kar. et Kir., general aspect, flower; 2 — *Ph. alaica* Knorr., upper part of stem, flower; 3 — *Ph. canescens* Rgl., upper part of stem, flower.

Series 5. *Urodontae* Knorr. — Radical leaves ovate, cordate at base, crenate, glabrous above, sparsely hairy on the veins beneath; nutlets with short hairs at apex; calyx teeth with point half the length of the tube; corolla creamy-pink.

39. *Ph. urodonta* M. Pop. in Nov. Mem. Mosk. obsch. isp. prir. XIX (1940) 40.

- 99 Perennial, 60–70 cm high; stems whitish, purple toward summit, palmately branched glabrous, with long hairs under inflorescence; radical leaves ovate, cordate at base, 15–16 cm long and 6–7 cm broad, crenate, obtusish; cauline leaves similar, smaller; floral leaves oblong, entire; upper side of leaves glabrous, the lower sparsely hairy on veins; radical leaves on petiole 16–17 cm long, the cauline on petiole 3 cm long; floral leaves sessile; verticillasters many-flowered, the lower 2 or 3 distant, the others approximate, bracts numerous, lanceolate; as long as or slightly shorter than calyx tube, sparsely pubescent; calyx coriaceous, tubular-campanulate, prominently nerved, the nerves and margin of teeth with long articulate and simple hairs; calyx teeth broad-ovate, 3–4 mm long, with a point 5–8 mm long; corolla stramineous or creamy-pink (?), covered outside to the tube with 1- or 2-jointed hairs; upper lip slightly shorter than the lower, unevenly toothed, densely bearded at margin inside; lower lip flabellately 3-lobed, the middle lobe broadly rounded, shallowly emarginate at apex and toothed at margin, the lateral lobes ovate; anthers and style exserted; filaments with broadly oblong appendages; lobes of stigma unequal; nutlets short-haired at apex. June–July.

In upper part of the woodland and scrub zone, in scrub. — Centr. Asia: T. Sh. (W.). Endemic. Described from the Lake Sary-Chilek area. Type in Tashkent; cotype in Leningrad.

Series 6. *Tuberosae* Knorr. — Roots often with tuberous swellings; leaves triangular-ovate, crenate-serrate or round-toothed, covered above with simple hairs, stellate-hairy beneath; corolla pink or lilac; nutlets with a short tuft of hairs or with long hairs.

40. *Ph. tuberosa* L. Sp. pl. (1753) 586; M. B. Fl. taur-cauc. II, 56; Bge. in Ldb. Fl. alt. 412; Benth. Lab. Gen. et sp. 632 et in DC. Prodr. 544; Boiss. Fl. or. IV, 792; Regel' in Tr. Bot. sada, IX, 587; Shmal'g. Fl. II, 343; O. and B. Fedch. Perech. rast. Turk. V, 171; Popov in Byull. Sredneaz. univ. 13, 137; Fl. Yugo-Vost, VI, 150; Grossg. Fl. Kavk. III, 302; Kryl. Fl. Zap. Sib. IX, 2333. — *Phlomoides tuberosa* Moench, Meth. pl. (1794) 404. — *Phlomidopsis tuberosa* Link, Handb. (1829) 489. — Ic.: Fedch. and Fler. Fl. Evrop. Ross. 812; Syreishch. Fl. Mosk. gub. III, 109; Fl. Yugo-Vost. VI, 151. — Exs.: GRF, No. 3774.

- 100 Perennial, 40–150 cm high, the long stringlike roots with tuberous swellings; stem simple or branched, glabrous or slightly pubescent in inflorescence, violet-purple; radical and lower cauline leaves triangular, deeply cordate at base, crenate, 13–15 cm long and 10–12 cm broad; middle cauline leaves similar, with less deeply cordate base, 9–10 cm long and 7–8 cm broad; upper cauline leaves ovate-lanceolate, cordate at base, crenate-serrate; lower floral leaves 5 cm long and 2–2.5 cm broad, slightly exceeding the whorls, the upper lanceolate, sharply serrate-dentate (in var. *longifolia* Syreisch



floral leaves long-attenuate, much longer than whorls); upper side of leaves green, scabrous, with scattered few- and many-jointed appressed hairs, the lower side dull olivaceous, glabrous, with hairs only on veins (in var. *glabra* Pacz. stem and leaves glabrous or leaves with copious articulate hairs beneath); petioles of radical and lower cauline leaves 15–30 cm long, those of middle cauline leaves 5–7 cm long; upper leaves short-petioled or sessile; petioles covered with simple and articulate hairs; inflorescence long, with distant 10–16-flowered whorls; bracts 10–12 mm long, linear-subulate, partly free, partly connate in 2's or 3's, mostly appressed to and equaling or exceeding the calyx, covered with sparse long multiarticulate tubercle-based hairs; calyx glabrous or with scattered simple hairs, tubular-campanulate, 8–10 mm long, the teeth semiorbicular, produced into a subulate patent point; denticles and auricles mostly (not always) flanking the teeth; corolla pink or lilac,  $1\frac{1}{2}$ – $2\frac{1}{2}$  times as long as calyx; upper lip unevenly toothed at apex, densely bearded at margin inside; middle lobe of lower lip broad-ovate, slightly emarginate, the lateral lobes ovate; corolla covered outside with monoradial hairs, the tube glabrous, with simple multiarticulate hairs only at base; filaments exserted, with calcariform appendages; stigma usually with very unequal lobes; nutlets hairy at apex. May–August.

Steppe locations and mixed grass steppes. — European part: Lad.-Ilm., U.V., V.-Kama, U.Dnp., M. Dnp., V.-Don, Transv., U. Dns., Bes., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., W., E. and S. Transc.; W. Siberia: Ob., U. Tob., Irt.; E. Siberia: Yenisei, Lena-Kol., Ang.-Say.; Far East: Uss.; Centr. Asia: Ar.-Casp., Balkh., T. Sh. Gen. distr.: Centr. Eur., Bal.-As. Min., Arm.-Kurd., Iran., Dzu.-Kash. (Kul'dzha), Mong. Described from Siberia. Type in London.

Note. 1) Caucasian specimens are mostly characterized by the dense indument of leaves and calyx, consisting of monoradial hairs. They might be separated as ssp. *pseudotuberosa* Knorr.

2) In the Byulleten' Moskovskogo obshchestva ispytatelei prirody (Bulletin of the Moscow Naturalists Society), 5–6, 1939, 117, there is a short description, published 101 by P.A. Smirnov, of *Ph. desertorum* P. Smirn. which differs from *Ph. tuberosa* L. in having glabrous leaves, bracts rimmed with short 1- and 2-celled hairs, larger flowers of violet color (not pink), and all plant parts, except corolla, without stellate hairs.

Stalingrad region, upper reaches of river Golubaya, on silty soil. The taxonomic significance of this form is not clear.

41. *Ph. puberula* Kryl. et Serg. in Sistem. zam. po mater. gerb. Tomsk. univ. 3–4 (1933) 149; Kryl. Fl. Zap. Sib. IX, 2343.

Perennial, 25–35 cm high; stems simple, terete in lower part, 4-angled above, glabrous or very sparsely hairy, covered under inflorescence with small stellate and fascicled hairs; radical leaves ovate-triangular, deeply cordate at base, 5–10 cm long and 3–6 cm broad; lower floral leaves oblong; all leaves with rounded teeth, the upper side green, with scattered simple hairs, the lower side grayish with branched and stellate hairs; petioles of radical leaves densely covered with long retrorse hairs; upper leaves sessile; verticillasters 3–5, the lower distant, the upper approximate; bracts linear-subulate, slightly curved at base, 8–9 mm long, equaling or slightly exceeding the calyx, clothed with fine stellate and long simple hairs; calyx tube 8–9 mm long,

thinly stellate-hairy; calyx teeth rounded, subulate-pointed, subpatent; corolla lilac-pink, densely pubescent outside; upper lip cut at apex into unequal teeth, densely bearded at margin inside; lower lip with ovate-reniform middle lobe and short ovate lateral lobes; appendages of filaments oblong, recurved; lobes of stigma unequal; nutlets densely hairy at apex. June—July.

Forb and needlegrass-fescue steppes. — W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp. Described from W. Kazakhstan. Type in Leningrad.

42. *Ph. maeotica* Schost. in Bot. mat. gerb. Bot. inst. AN SSSR, VIII, 3 (1938) 36; Vozn. ros. URSR, 413.

Perennial, 50–85 cm high, with long roots; stem erect, branched in inflorescence, glabrous or pubescent, more or less profusely covered in lower half with 1- to many-jointed retrorsely appressed hairs, these sometimes intermixed with some branched hairs; upper part of stem brownish-violet, stellate-pubescent in inflorescence; radical leaves marcescent; cauline leaves on petiole 1–2.5 cm long, connate at base to form a 102 tube, covered with simple articulate and fascicled hairs; cauline leaves triangular-ovate, 6–7 cm long and 3.5–5 cm broad, long-acuminate, cordate at base, crenate-serrate; floral leaves sessile, slightly exceeding the whorls, the uppermost as long as or shorter than the whorls; upper side of leaves rugose, green, covered with scattered simple hairs and sporadically with stellate hairs; inflorescence of 5 or 6 distant many-flowered whorls; bracts linear-subulate, as long as calyx, densely covered with stellate and monoradial hairs; calyx 9.5–10 mm long, clothed with monoradial hairs; calyx teeth with a point 1.5–2 mm long; corolla one-and-a-half to twice as long as calyx, the tube covered outside from limb to middle with simple and branched hairs; upper lip unequally toothed at apex, white-bearded at margin inside; middle lobe of lower lip broad-ovate, undulate-margined, the lateral lobes much shorter, ovate; appendages of filaments long, linear, upturned; lobes of stigma unequal; nutlets with a short tuft of hairs. June.

Steppes. — European part: Bl. Endemic? Described from Dnepropetrovsk. Type in Kiev.

43. *Ph. hypanica* Schost. in Bot. mat. Bot. inst. AN SSSR, VIII (1938) 34; Vozn. rosl. URSR, 414. — *Ph. tuberosa* var. *hirsuta* Pacz. in Zap. Kievsk. obshch. estestv. XIII, 1 (1893) 124.— Ic.: Shost. op. cit.

Perennial, 20–60 cm high; roots with tuberous swellings; stem solitary, erect, simple or branched in inflorescence, whitish-lanate or glabrous; radical leaves triangular-ovate, cordate at base, 7–12 cm long and 4–10.5 cm broad, obtusish, crenate; cauline leaves oblong-ovate to triangular-ovate, 5–10 cm long and 2–7 cm broad, acuminate; lower floral leaves longer, the upper shorter than the whorls; upper side of leaves covered with simple multiarticulate hairs, the lower side copiously stellate-hairy; petioles of radical leaves 4.5–11.5 cm long, those of cauline leaves 2.5 cm long; upper cauline leaves sessile or with very short dilated petiole; inflorescence long; verticillasters 8–10, the lower distant, the upper approximate; bracts linear-subulate, 9–10 mm long, appressed to calyx, copiously covered with stellate and monoradial hairs, the

elongated ray of these much longer than others; calyx tubular-campanulate, 10–15 mm long, covered with stellate and occasional monoradial rays; teeth pointed, 2–3 mm long; corolla twice as long as calyx; upper lip ovate, unevenly toothed, densely long-bearded at margin inside; middle lobe of upper lip broad-ovate, undulate-margined, the lateral lobes short, broad-ovate; filaments included in corolla; stigma with unequal lobes; nutlets with tufts of short hairs at apex. May–July.

Steppe zone, on gravelly slopes. — European part: Bes., Bl., L. Don. Described from the vicinity of Berislavl. Type in Khar'kov.

44. *Ph. agraria* Bge. in Ldb. Fl. alt. II (1830) 411; Benth. Lab. Gen. et ap. 532 et in DC. Prodr. XII, 544; Ldb. Fl. Ross. III, 438; Regel' in Tr. Bot. sada, IX, 589; O. and B. Fedch. Perech. rast. Turk. V, 171; Kryl. Fl. Zap. Sib. IX, 2342; Popov in Byull. Sredneaz. univ. 13, 147. — *Ph. tuberosa* var. *agraria* Trautv. in Tr. Bot. sada, X (1887) 425. — Ic.: Ldb. Ic. pl. Fl. Ross. tab. 364; Regel', op. cit. Plate X.

Perennial, 40–60 cm high, with stringlike roots; stems several, simple or branched, covered, as are petioles, with appressed retrorse hairs and under inflorescence also glandular-hairy; radical leaves triangular-cordate, 8–10 cm long and 4–6 cm broad; lower cauline leaves 5.5 cm long and 3–3.5 cm broad, the upper similar but smaller; floral leaves 1.5 cm long and 6–8 mm broad, ovate, acuminate, the lower longer, the upper shorter than the whorls; all leaves with obtuse rounded teeth, the upper side green, covered with simple hairs, the lower side with stellate and simple hairs; petioles of radical leaves 5–8 cm long, those of cauline leaves 2–2.5 cm long; upper cauline and floral leaves sessile; verticillasters 10–12-flowered, the lower distant, the upper approximate, forming a long inflorescence; bracts linear-subulate, spinescent, 8–9 mm long, covered with multiarticulate spreading hairs; calyx tubular-campanulate, 10–12 mm long, with semiorbicular or rounded subulate-pointed teeth, covered with small stellate hairs, with long and short articulate hairs on the nerves, and with some glandular hairs; corolla pink, more rarely white (f. *alba* Trautv.), twice as long as calyx, the tube glabrous outside, covered from throat upward with multiarticulate hairs; upper lip ovate, sharp-toothed, with a dense fringe of hairs at margin inside; lower lip with rounded-reniform middle lobe and ovate lateral lobes; stigma with unequal lobes; appendages of filaments calcariform; nutlets hairy at apex. June–July.

In steppe and forest-steppe belts, slopes and in plains, needlegrass and fescue steppes and scrub. — W. Siberia: Irt., Alt.; Centr. Asia: Balkh. Gen. distr.: Mong., Dzu.-Kash. Described from Semipalatinsk. Type in Leningrad.

104 45. *Ph. scythica* Klok. et Schost. in Bot. mat. gerb. Bot. inst. AN SSSR, VIII (1938) 31; Vozn. rosl. URSR, 413. — *Ph. tuberosa* var. *hypoleuca* Trautv. in Tr. Bot. sada, I (1872) 189.

Perennial, with short rhizome; stems two, 30–80 cm long, simple or branched toward summit, 4-angled, violet, glabrous; radical leaves ovate-triangular, deeply cordate at base, 5–16 cm long and 8–11 cm broad, acuminate, coarsely crenate; cauline leaves oblong-lanceolate or oblong-ovate, 5.5–9 cm long and 3–5 cm broad, sharply toothed, with a shallower sinus at base; lower floral leaves exceeding the whorls,



3.5 cm long and 1.5 cm broad, the upper 1–2 cm long and 1–1.5 cm broad; all leaves covered above with scattered simple hairs sometimes intermixed with stellate hairs, or glabrous, white beneath with copious stellate and monoradial hairs; petioles glabrous or sparsely stellate-hairy; petioles of radical leaves 8–18.5 cm long, dilated at base, connate into a short tube, those of cauline leaves 2–5.5 cm long; floral leaves sessile; verticillasters 6–8, widely spaced, the upper approximate; bracts 10–12 mm long, linear-subulate, as long as or slightly longer than calyx, covered with multiarticulate hairs; calyx prominently nerved, 8–10 mm long, covered with scattered 2–3-jointed and few stellate hairs, the teeth 3–5 mm long; corolla lilac-rose, twice as long as calyx, covered outside from middle upward with long and stellate hairs; upper lip unevenly toothed, with dense projecting hairs at margin inside; middle lobe of lower lip broad-ovate, emarginate, the lateral lobes broadly oblong; filaments included in corolla, with long calcariform appendages; lobes of stigma unequal; nutlets dark brown, with dense short hairs at apex. June–July.

Steppe zone, in depressions. — European part: Bl. Endemic. Described from Askaniya Nova. Type in Khar'kov.

46. *Ph. hybrida* Zelen. Mater. dlya Flory Kryma (1906) 353; Shost. in Bot. mat. gerb. Bot. inst. AN SSSR, VIII, 9, 150. — *Ph. salina* Lindem. in Sched. ex Zelen. l. c. 334.

Perennial, 35–60 cm high; stem simple, erect, branched above, covered in lower part with bristly and stellate hairs or glabrous; lower leaves triangular-ovate, deeply cordate at base; floral leaves similar, smaller, the upper ovate or ovate-rhomboid, as long as or longer than the whorls, all with rounded teeth, covered above with simple 105 hairs, with stellate and multiarticulate hairs beneath; verticillasters 7 or 8, many-flowered, the lower distant, the upper approximate; bracts subulate, with tubercled-setiform and stellate hairs; corolla pink; upper lip unevenly toothed, long-haired at margin inside; middle lobe of lower lip broad-ovate, toothed, the lateral lobes ovate; filaments with long linear appendages at base; lobes of stigma unequal; nutlets hairy at apex. May–July.

Steppes, in depressions. — European part: Crim., Bl. Described from Crimea (Sary-Buza). Type in Nikita Botanical Garden.

Note. Zelenetskii regarded this species as a hybrid between *Ph. herba-venti* and *Ph. tuberosa*. This assumption is incorrect as *Ph. tuberosa* occurs in Askaniya Nova only as a rare adventive.

47. *Ph. maximoviczii* Rgl. in Tr. Bot. sada, IX (1886) 594; Kom. and Alis. Opred. rast. Dal'nevost. kr. II, 903. — *Ph. umbrosa* Maxim. Prim. Fl. Amur. (1895) 476, non Turcz. (1840). — Ic.: Regel', op. cit. Plate X, Fig. 18a.

Perennial, 80–100 cm high; stems erect, branched in upper part, 4-angled, brown, subglabrous; leaves thin, herbaceous; radical leaves broad-ovate, acuminate, sharply serrate or dentate; lower cauline leaves similar, smaller, 9–15 cm long and 8–10 cm broad; upper cauline still smaller; lower floral leaves ovate-lanceolate, sharply serrate, the uppermost 2–3 cm long and 1–2 cm broad, entire or toothed at apex; floral leaves

exceeding the whorls, only the uppermost equaling them; upper side of leaves covered with scattered setiform leaves, green, the lower side with monoradial hairs; petioles of lower cauline leaves 7–9 cm long, the upper 2–3 cm long; bracts subsessile; verticillasters distant, many-flowered, short-peduncled; flowers sessile: bracts broadly lanceolate or narrowly lanceolate, long-acuminate, 9–10 mm long, equaling or exceeding the calyx, the margin ciliate; calyx tubular, slightly expanded upward, 8–10 mm long, covered with long scattered bristly hairs, in places glabrescent, the teeth short-triangular, with a short subulate subpatent point; corolla pink, one-and-a-half times as long as calyx, covered up to throat with multiarticulate and monoradial hairs, the tube covered in middle part with scattered multiarticulate hairs, glabrous below; upper lip with unevenly toothed margin, densely long-bearded at margin inside; lower lip with broad-ovate middle lobe and ovate lateral lobes; filaments pubescent in upper part, slightly exerted, with calcariform appendages; lobes of stigma unequal; nutlets glabrous. July–August.

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Deciduous and mixed woods, forest margins and river banks. — Far East: Uss. Endemic. Described from Slavyanka, using plants collected by Maksimovich. Type in Leningrad.

Series 7. *Alaicae* Knorr. — Flowers creamy-pink, the hood long-haired above; nutlets subglabrous, leaves oblong-ovate or oblong, gray beneath with stellate or monoradial hairs.

48. *Ph. alaica* Knorr. in Bot. mat. gerb. Bot. inst. AN SSSR, XV (1953) 338.

Perennial, 70–85 cm high, with long slender roots; stem solitary, erect, simple, covered in lower part with multiarticulate hairs, with scattered short hairs above, densely covered under inflorescence with stellate and monoradial hairs (the elongated ray 5 times the length of others); radical leaves oblong-ovate, subcordate or cuneate at base, 10–11 cm long and 4.5 cm broad; lower cauline leaves 5–6 cm long and 1.5–2 cm broad, crenate-dentate; lower floral leaves lanceolate, 4–5 cm long and 1–1.5 cm broad, serrate, exceeding the whorls, the upper lanceolate, 1.5 cm long and 4–5 mm broad, sharply toothed at apex, shorter than the whorls, the upper side olivaceous, rugose, covered with stellate and monoradial hairs, the lower side grayish with monoradial and inequiradial hairs; petioles of radical leaves 10–12 cm long, those of cauline leaves 1.5–8 cm long; lower floral leaves with petiole 8–10 mm long, the upper sessile; calyx long-haired; inflorescence long; lower whorls distant, the upper approximate; bracts subulate, 6–7 mm long, the lower free, the upper connate in 2's, with inequiradial and monoradial hairs (the latter with elongated ray 5 times the length of others); calyx tubular-campanulate, 8–10 mm long, with few-jointed hairs at base and 4–5-jointed hairs above; calyx teeth notched, produced into an elongate subulate spiny point, flanked with obtusely rounded brown triangular auricles; corolla creamy-pink, half as long again as calyx; upper lip exceeding the lower, unevenly toothed at apex, long-bearded at margin inside; middle lobe of lower lip broadly obovate, the lateral lobes short, ovate; corolla tube pubescent under the throat, glabrous below; filaments

exserted, pubescent, with long curved appendages; nutlets subglabrous (in some specimens with sporadic hairs). May–July. (Plate VI, Figure 2).

- 107 Woodland and scrub belt, in grass and mixed-grass associations. — Centr. Asia: Pam.-Al. Endemic. Described from Gul'cha in Alai range. Type in Leningrad.

49. *Ph. knorringiana* M. Pop.

- Perennial; rhizome woody, short, oblique, branched at summit, producing 2 or 3 gemmae at the sides of the flowering shoot, the gemmae enveloped by remnants of old petioles; stem erect, 4-angled, to 100 cm long, brachiately branched; branches few, opposite, long, bearing verticillasters like the summit of stem, the lowest internode of stem hirsute, the upper internodes shortly stellate-pubescent, the faces almost flat; blades of radical leaves oblong, not ovate as in other species of the subgenus *Phlomidopsis*, slightly cordate at base, sometimes truncate or subcuneate, 10–20 cm long, 4–6 cm broad, membranous, soft (not rigid coriaceous), evenly and closely crenate-dentate (with 20–30 teeth at each side), obtuse, gray, whitish-gray with dense stellate down and prominently netted-veined beneath, faintly grayish with much sparser indument above; petioles somewhat shorter than blade, slender, sparsely hairy; cauline leaves few, shorter and narrower, with shorter petiole; floral leaves lanceolate, slightly pointed, exceeding verticillasters; verticillasters compact, few-flowered [?], small, 2 cm in diameter, subglobose, remote; bracts rigid, thickly subulate, grayish with stellate down, glabrous at apex, spinescent, slightly exceeding the calyx; calyx campanulate, 8–9 mm long, grayish with stellate hairs, some rays of these elongated; calyx teeth very short, truncate, with rigid spreading spine 3 mm long from apical notch; corolla 12 mm long; hood obtuse, very densely white-haired outside and inside; lower lip somewhat shorter than or as long as the galea, obcordate, 3-lobed, the lateral lobes ovate, obtuse, short, the middle lobe longer, obcordate-cuneate, all lobes hairy outside (beneath); style with very unequal lobes; anterior filaments longer than the posterior, glabrous, unappendaged; posterior filaments villous at the middle (at insertion to corolla tube), adnate below to the tube and thus nearly reaching the ring of hairs at the base of the tube and there furnished with flat membranous subquadrate erect obtuse appendages; nutlets subglabrous. May–June.
- 108 Centr. Asia: W. T. Sh. Endemic. Described from Uzgen. Type in Leningrad.

Note. Among the Central Asian species of the subgenus (or genus) *Phlomidopsis*, this species most closely approaches true *Euphlomis*; its leaves are much narrower than those of any species of the subgenus *Phlomidopsis* so far described and they recall leaves of *Euphlomis*. *Ph. knorringiana* combines this character with dense stellate pubescence which again is characteristic of *Euphlomis* rather than of *Phlomidopsis*, and also the subulate spinescent bracts and not the softer flat bracts common among species of *Phlomidopsis*. However, notwithstanding all these features which tend toward *Euphlomis*, the corolla of our species is clearly typical for *Phlomidopsis* and so are the obtuse apex and the obtuse teeth of the leaves. The base of the leaf blade does not have the cordate shape characteristic of *Phlomidopsis*, but it has not acquired the cuneate shape associated with *Euphlomis*.

Thus, this species represents a complex mixture of characteristics of both subgenera in almost every part of the plant. This blending of characters is indeed very striking in the case of *Ph. knorringiana*; the intrusion of features of *Euphlomis* is much less pronounced in other members of *Phlomidopsis*. For instance, *Ph. canescens*



Rgl. has the short, gray, stellate pubescence of *Euphlomis*, but the leaves are broad-ovate, cordate at base, i.e. typical for *Phlomidopsis*. Other *Phlomidopsis* species display even fewer features of *Euphlomis*. There is undoubtedly a wide amplitude of differentiation ranging from typical *Phlomidopsis* to typical *Euphlomis*.

DUBIOUS SPECIES

One of the dubious appellations is *Phlomis discolor* Ldb. (Fl. Ross. III (1849) 435).

Genus 1267.\* *Stachyopsis*\*\* M. Pop. et Vved.

M. Pop. et Vved. in Tr. Turk. nauchn. obshch. I (1923) 120

Calyx broadly conical, 10-nerved; calyx teeth 5, equal, erect, subulate-lanceolate, triangular at base; corolla 2-lipped, pink, the tube with a ring of hairs inside; upper lip galeate, with dense long hairs above; lower lip spreading, glabrous, about as long as the upper lip, the middle lobe much broader than the lateral, rounded or obovate; 109 slightly emarginate; upper filaments hairy, the lower glabrous, the anthers divergent; style with 2 subulate lobes; nutlets oblong, trigonous with sharp angles, obliquely truncate at apex, glabrous. Perennials with simple coarsely dentate leaves.

The genus contains three species distributed in the mountain regions of Soviet Central Asia and adjoining mountain areas of western China (Kuldja).

- 1. Middle and lower leaves on petiole 0.5–3 cm long, oblong-ovate, the margin coarsely serrate-dentate; calyx glabrous or with short appressed hairs . . . . . 3. *S. oblongata* (Schrenk) M. Pop. et Vved.
- + All leaves sessile; calyx lanate . . . . . 2.
- 2. Leaves cordate at base, subglabrous; bracts and calyx teeth soft; stems solitary, 25–80 cm long, only on ribs with short retrorse hairs . . . . . 1. *S. lamiiflora* (Rupr.) M. Pop. et Vved.
- + Leaves cuneate at base, gray-velutinous on both sides; bracts rigid; stems numerous, 15–25 (40) cm long, both ribs and faces gray-velvety . . . . . 2. *S. marrubioides* (Rgl.) Ik.-Gal.

1. *S. lamiiflora* (Rupr.) M. Pop. et Vved. in Tr. Turk. nauchn. obshch. I (1923) 122; Ik.-Gal. in Izv. Glavn. bot. sada, XXVI, 72. — *Stachys lamiiflora* Rupr. Sertum tianschan. (1869) 67. — *Phlomis lamiiflora* (Rupr.) Rgl. in Tr. Bot. sada, VI, 1 (1879) 374 and IX (1886) 593; p.p.; O. and B. Fedch. Perech. rast. Turk. V, 172.

\* Treatment by L.A. Kupriyanova.  
\*\* *Stachyopsis* resembles *Stachys* and is identical in appearance.

Perennial; stems mostly solitary, 25–80 cm long, erect, unbranched, with glabrous faces, the ribs with short retrorse hairs; all leaves sessile, 6–10 cm long and 3–5 cm broad, the lower and middle broad-ovate, cordate at base, the upper oblong-ovate, rounded at base; margin of leaves coarsely dentate, the upper side with scattered appressed hairs, the lower more sparsely hairy; inflorescence short, with distant whorls; bracts soft, lance-linear, rarely narrowly linear, 1 cm long and 1.5 mm broad; calyx conical, lanate, the teeth soft, triangular at base, gradually long-acuminate; corolla light pink, 23 mm long; upper lip with dense white hairs, to 10 mm broad; lower lip 3-lobed, the middle lobe cordate-suborbicular, 6 mm long and 6–7 mm broad, with toothed margin, the lateral lobes much shorter. June–July.

Mountain slopes, in the spruce forest belt. — Centr. Asia: Dzu.-Tarb. (Dzharkent area), T. Sh. Gen. distr.: Dzu.-Kash. (Kuldja). Described from Tien Shan (Kastek pass). Type in Leningrad.

- 110 2. *S. marrubioides* (Rgl.) Ik.-Gal. in Izv. Glavn. bot. sada, XXVI (1927) 72. — *S. oblongata* var. *canescens* (Rgl.) M. Pop. et Vved. in Tr. Turk. nauchn. obsch. I (1923) 122. — *Phlomis marrubioides* Rgl. in Tr. Bot. sada, VI (1879) 375. — *Phlomis oblongata*  $\beta$  *canescens* Rgl. in Tr. Bot. sada, IX (1886) 593; O. and B. Fedch. Perech. rast. Turk. V, 172.

Perennial; stems numerous, 15–25 (40) cm long, erect or ascending, branched, densely grayish-velutinous on the ribs and especially on the faces; all leaves sessile, rarely on petiole 3–4 mm long; lower and middle leaves oblong-ovate, 2.5–4.5 cm long, cuneate at base; upper leaves lanceolate, rather finely serrate, gray-velutinous above and beneath; inflorescence long, with distant verticillasters; bracts rigid, upright, densely villous, 1 mm long and 1 mm broad; calyx conical, the teeth erect, rigid, gradually attenuate from triangular base to a subulate point; corolla intensely pink, 18–20 mm long; upper lip covered with long white hairs, 5–7 mm broad; lower lip 3-lobed, the middle lobe cordate, deeply emarginate. June–August.

Mountain slopes above the forest belt, alpine meadows. — Centr. Asia: Dzu.-Tarb. (Dzungarian Alatau). Gen. distr.: Dzu.-Kash. (Kuldja). Described from Dzungarian Alatau (Chubaty). Type in Leningrad.

3. *S. oblongata* (Schrenk) M. Pop. et Vved. in Tr. Turk. nauchn. obshch. I (1923) 121. — *Phlomis oblongata* Schrenk, Enum. pl. nov. (1841) 29; Benth. in DC. Prodr. XII, 544; Ldb. Fl. Ross. III, 437; Regel' in Tr. Bot. sada, IX, 591, Plate X, Fig. 15a and b; O. and B. Fedch. Perech. rast. Turk. V, 172. — *Leonurus dschungaricus* Rgl. in Tr. Bot. sada, VI (1879) 367. — Ic.: Regel', op. cit.

Perennial; stems mostly solitary, 55–80 (100) cm long, erect, branched in middle and upper part, glabrous or with sparse short appressed hairs on the ribs; all leaves, except in inflorescence, with petiole 0.5–3 cm long; lower and middle leaves oblong-ovate, 6–12 cm long and 4–6 cm broad, with a straight or broadly cuneate base; leaves in inflorescence oblong-lanceolate, 6–9 cm long and 1–2 cm broad, the margin with large sharp antrorse teeth, the upper and lower side glabrous or with scattered short hairs; inflorescence long, branched, with distant whorls; bracts subulate, rigid,

glabrous, 1 cm long and 0.5–1 mm broad; calyx conical, glabrous or with sparse, very short appressed hairs, the teeth rigid, firm, erect, rather abruptly passing from triangular base to a subulate point; corolla violet-rose, 15–18 mm long; upper lip rather  
111 sparsely covered with long white hairs; lower lip 3-lobed, the middle lobe obovate, the lateral lobes short. July–September.

Mountain slopes above the forest belt, subalpine meadows and scrub. — Centr. Asia: Dzu.-Tarb., Syr D. (mountains), T. Sh., Pam.-Al. Described from Dzhilkaragai. Type in Leningrad.

Note. Specimens occur in Tadzhikistan (Yagnov, Karategin, Zeravshan) and Kirgizia (Osh), which show resemblance to both *S. oblongata* (Schrenk) M. Pop. et Vved. and *S. marrubioides* (Rgl.) Ik.-Gal.

It was probably on account of these plants that Regel referred *Phlomis marrubioides* to *Ph. oblongata* as var. *canescens*.

*S. marrubioides* is a morphologically well defined species, occurring in the USSR in the alpine zone of Dzungarian Alatau. According to available information it also grows outside the USSR in mountain areas of western China (Kuldja).

*S. oblongata* grows in the subalpine zone of Central Asian mountains (except Pamir); it usually occurs in scrub and among tall grass. The occurrence in the eastern parts of Tadzhikistan and in eastern parts of Kirghizia of plants displaying characters of both species in no way detracts from the independent standing of these species; it only shows that the distribution area of *S. marrubioides* apparently stretches much further southward than known at present. The relationship between the two species has not yet been sufficiently clarified and field observations are needed.

## Genus 1268.\* *Galeopsis*\*\* L.

L. Sp. pl. (1753) 579. — *Ladanum* et *Tetrahit* Gilib. Fl. lithuan. II (1781) 82

Calyx tubular-campanulate, 10-nerved, with 5 subequal subulate-pointed teeth; corolla tube long, dilated in upper part, without a ring of hairs inside, bilabiate; upper lip galeate, toothed at apex; lower lip 3-lobed, the middle lobe about equaling or larger than the lateral, with 2 hornlike protuberances (apophyses); stamens 4, parallel, appressed to upper lip, the outer two longer; anthers opening by two valves with fimbriate margin; style 2-branched; nutlets obovoid, compressed laterally, smooth. Annuals, mostly pubescent, with ovate-lanceolate or lanceolate petiolate dentate-margined (very rarely entire) leaves; flowers sessile; verticillaster 6–10-flowered, in the leaf axils.

112 About ten species in the temperate part of Eurasia (mainly in Western Europe).

1. Stem softly appressed-hairy (without bristly hairs), not inflated under nodes; calyx teeth as a rule shorter than the tube; middle lobe of lower lip half as broad again as the lateral lobes . . . . . 1. *G. ladanum* L.

\* Treatment by S.V. Yuzepchuk.

\*\* A plant name used by Dioscorides, derived from the Greek words *galea* (or *gale*), European polecat, and *opsis*, appearance (from likeness of the flower to the head of this animal).



- + Stem with appressed bristles at least under nodes, inflated above [should be under — Transl.] nodes; calyx teeth not shorter than the tube; middle lobe of lower lip scarcely broader than the lateral lobes . . . . . 2.
- 2. Stem with spreading bristles under nodes, with soft appressed hairs elsewhere; bracts filiform-acicular, 4–5 mm long (shorter than calyx tube, occasionally nearly as long), 0.25–0.5 mm broad at base; flowers large, purple . . . . . 2. *G. pubescens* Bess.
- + Indument of stem consisting of spreading bristles, very rarely comprising few soft hairs; bracts lance-linear, 5–12 mm long (equaling calyx tube or even exceeding the teeth), 0.5 to 2 mm broad at base . . . . . 3.
- 3. Flowers 2–3.5 cm long, pale yellow, with lilac throat; corolla tube half as long again as calyx . . . . . 3. *G. speciosa* Mill.
- + Flowers (10) 12–15 mm long, mostly pink or purple; corolla tube slightly exceeding or equaling the calyx . . . . . 4.
- 4. Middle lobe of lower lip rather broad, subquadrate, not emarginate, with flat margins after flowering; markings confined to its lower part; stems hairy mostly on the swellings under the nodes; base of leave mostly rounded . . . . . 4. *G. tetrahit* L.
- + Middle lobe of lower lip narrow, emarginate, covered to the margins with markings or with uninterrupted spot, the margins at length strongly revolute; stems hairy all over; base of leaves mostly broadly cuneate . . . . . 5. *G. bifida* Boenn.

Subgenus 1. **Ladanum** (Gilib. pro gen.) Rchb. Fl. Germ. exc. (1830) 322. — Horn-like protuberances (apophyses) of corolla gradually decurrent into throat, separated by a wide sinus; nutlets with a necklike appendage at base; stem without swellings under nodes and without adventitious axillary buds; indument homogeneous, composed of simple, 1- or many-celled nontubercled hairs.

1. *G. ladanum* L. Sp. pl. (1753) 579; Ldb. Fl. Ross. III, 1, p.420; Shmal'g. Fl. 113 II, 332; Kryl. Fl. Zap. Sib. IX, 2346; Yuzepchuk in Sorn. rast. SSSR, IV, 45. — *G. intermedia* Vill. Prospect. (1779) 21; Hist. pl. Dauph. II (1787) 387. — *G. ladanum* subsp. *intermedia* Briq. Lab. Alp. Marit. (1891) 168 et Monogr. Galeops. (1893) 259. — *G. parviflora* Lam. Encycl. meth. II (1786) 600. — *G. latifolia* Hoffm. Deutschl. Fl. II (1804) 8. — *G. canescens* Schult. Observ. bot. (1809) 108. — *G. glandulosa* C. Koch in Linnaea, XXI (1848) 681. — *G. agrigena* K.-Pol. in Izv. Bot. sada, XVI (1916) 228. — *Ladanum purpureum* Gilib. Fl. lithuan. II (1781) 82. — *Tetrahit ladanum* Moench, Meth. pl. (1794) 394. — Ic.: Sturm, Deutschl. Fl. XIV, LXII (1833) tab. 979; Rchb. Ic. fl. Germ. XVIII, tab. 27, fig. III; Syreishch. Fl. Mosk. gub. III, 97. — Exs.: Pl. Finl. exs. No. 2075.

Annual; stem 10–40 (70) cm long, sometimes reddish, especially in lower part, mostly rather strongly branched, not inflated under nodes, appressed-hairy, often glandular, never setiferous; leaves 1–4 (rarely up to 7) cm long, 3–20 mm broad,

ovate-lanceolate, acute or acuminate, with shallowly toothed margin (3–7 teeth at each side), soft-haired or subglabrous above and beneath, short-petioled; verticillasters 6–10-flowered, more or less distant; bracts lanceolate or lance-linear, subulate-pointed, not exceeding the calyx teeth; calyx 8–10 mm long, densely covered with soft appressed hairs, sometimes glandular, obscurely nerved, the teeth unequal, lanceolate, acute, about half the length of the tube; corolla 2–2.3 cm long, appressed-hairy outside, the tube much longer than calyx, whitish; upper lip ovate, 2.5–3 mm broad, slightly produced into a beak terminating in 2 obtusish teeth; lower lip purple, with a pale spot and dark purple reticulate markings at base (near the throat), the middle lobe broadly obovate, 5–6 (7) mm broad, half as broad again as the lateral, crenate or obtusely dentate; nutlets obovoid, 2.25–2.5 mm long, 1.5 mm broad, 0.75 mm thick, rounded outside, 2-faced on the inside, with a small areola at base, finely tuberculate, dark gray or sometimes brownish, with dark marmoreal markings. June–August. (Plate VII, Figure 1.)

Cultivated and fallow fields, wastelands, often after harvest, rubbish heaps, roadsides. — European part: Kar.-Lap., Dv.-Perch., Balt., Lad.-Ilm., U.V., V.-Kama, U.Dnp., M.Dnp., V.-Don., Transv., Bl., U.Dns., Crim.; Caucasus: Cisc., Dag. W. and E. Transc. (Georgia), S. Transc.; W. Siberia: Ob., U. Tob. (Kustanai), Irt. (Akmolinsk), Alt.; E. Siberia: Ang.-Say.; Far East: Kamch., Uss.; Centr. Asia: Syr D. (Tashkent). **Gen. distr.:** Scand. (except the arctic part), Centr. and Atl. Eur. Described from Europe. Type in London.

- 114 Note. *G. agrigena* K.-Pol., with a dark (not pale) blotch on the lower lip, was apparently described by B.M. Kozo-Polyanskii from a single, casually encountered specimen. Even though it retains this character in cultivation (as reported by Kozo-Polyanskii), it merely represents, in our opinion, an individual variation of *G. ladanum* L. Kozo-Polyanskii's claim that *G. ladanum* and *G. agrigena* are pollinated by different species of bumblebees, does not provide a valid argument.

Fedchenko and Flerova, in "Flora Evropeiskoi Rossii," p. 813, reported (without stating location) a west European species related to *G. ladanum*, *G. angustifolia* (under the name *G. ladanum* var. *angustifolia* (Ehrh.) Wallr.). It may have been this source that Gams (Hegi, Ill. Fl. V, 4, 2460) had in mind when expressing doubt concerning the occurrence of *G. angustifolia* on Russian territory. *G. angustifolia* was not reported for the territory covered by the flora of the USSR by either Ledebour or Schmalhausen; it is not indicated for the larger part of the territory of Poland (except the south-east) in Szafer's "Rosliny Polskie" and other sources, nor is it reported by Klovkov in the more recent "Viznachnik roslin URSR" and other authorities. There is no reason to doubt that the inclusion of this species in the "Flora" by Fedchenko and Flerova is due to a misunderstanding. More recently, it has again been reported for the Karelo-Finnish SSR (see Stankov-Taliev, *Opredelitel'*, 862) and for the Baltic States, but we have not seen any relevant material. If this report is based on proper identification, this must be a case of accidental introduction of this neophyte. *G. angustifolia* Ehrh. has linear or lanceolate (not ovate-lanceolate) leaves, mostly 2 to 5 (7) mm broad, entire or with 1 to 4 very short teeth at each side; corolla in this species in  $2\frac{1}{2}$ –3 times as long as calyx.

This section contains another west European (Atlantic) species, *G. dubia* Leers. (with upper leaves and calyx characteristically glandular and yellow flowers) which had been reported by older authorities, under various appellations, for the vicinity of Peterburg (Gorter) and for Lithuania (Gilibert, Yundzhil). It was also included (under the name *G. ochroleuca* Lam.) in Ledebour's *Flora Rossica* (III, 419–420), with a reference to these authors. However, these reports are undoubtedly wrong and belong to other species.

**Economic importance.** The seeds contain "hempnettle oil," with fat content of 45.9% and iodine number 145.6. A nectariferous plant but also a noxious weed (see also information on the economic importance of the genus under *G. speciosa* Mill.).

Subgenus 2. **Tetrahit** (Gilib. pro gen.) Rchb. Fl. Germ. exc. (1830) 323. — The hornlike protuberances (apophyses) of corolla conical, porrect; nutlets without necklike  
115 appendage at base; stems inflated under nodes, often with adventitious axillary buds; indument of two components: simple 1- or many-celled hairs embedded among epidermis cells and bristly hairs borne on multicellular tubercles.

**Note.** We refrain from combining the four species belonging to this subgenus into any subgroups in view of the inconsistency of views relating to this subject. Briquet, in his well known monograph of the genus, considered *G. tetrahit* L. and *G. bifida* Boenn. as subspecies of the same species; if this approach were adopted, they would have to be combined in our "Flora" into a series. Porsch, in a study of the Austrian species of the subgenus *Tetrahit*, subdivides the subgenus, mainly by flower color, into two "types": *Tetrahit*-Typus, in which he places *G. tetrahit* L. and *G. pubescens* Bess., and *Bifida*-Typus, composed *G. bifida* Boenn. and *G. speciosa* Mill. Finally, Muentzing (whose studies will be discussed below) combines *G. pubescens* Bess. and *G. speciosa* Mill. on the one hand, and *G. tetrahit* L. and *G. bifida* Boenn. on the other hand, into two different "coenospecies" (on the basis of chromosome number and ease of hybridization). Personally, we consider the classification proposed by Porsch to be the most correct one (we would not, however, place the tetraploid small-flowered species *G. tetrahit* L. and *G. bifida* Boenn. at the head of the corresponding groups, since they can hardly be regarded as parental species).

2. *G. pubescens* Bess. Prim. Fl. Galic. II (1809) 27; Shmal'g. Fl. II, 333; Porsch in Abhandl. Zool.-bot. Ges. Wien, II, 2, 79; Yuzepchuk in Sorn. rast. SSSR, IV, 42. — *G. cannabina* K. Gmel. Fl. bad. II (1806) 623, non Pall. nec Roth. — *G. walteriana* Schlecht. Fl. Berol. I (1823) 320. — *G. versicolor* Spenner, Fl. Friburg. II (1826) 394, non Curt. — *G. variegata* Wenderoth, Fl. Hassiaca (1846) 195. — *G. tetrahit*  $\beta$  *pubescens* Benth. in DC. Prodr. XII (1848) 498; Ldb. Fl. Ross. III, 421. — Ic.: Sturm, Deutschl. Fl. XIV, LXII, tab. 985; Rchb. Ic. bot. I, tab. XLVIII; Rchb. Ic. fl. Germ. XVIII, tab. 29, fig. II; Porsch, l.c. tab. I, fig. 4–13. — Exs.: Fl. exs. Austro-Hung. No. 2139.

Annual; stem slender, 20–50 cm long, strongly branched, slightly inflated under nodes, covered with fine spreading bristles, soft appressed white hairs, and glandular hairs with



black heads, the indument below the nodal swellings being usually restricted to hairs of the second type; leaves 3–7 (12) cm long, 1–4 cm broad, rounded or sometimes subcordate at base, acuminate to subobtusate, with numerous (10–20) subtriangular serrate small teeth (the outer margin of these straight or slightly convex), thin, pale green, paler  
116 and sometimes glaucescent beneath, appressed-hairy on both sides, the hairs shorter beneath; petioles (0.6) 1–2 (3) cm long; verticillasters relatively loose, 2–6-flowered; bracts linear-subulate, 4–5 mm long; calyx 7–10 mm long, rather inconspicuously nerved, soft-haired, the margin (between the teeth) with soft bristles, the teeth rather soft, as long as tube, more rarely nearly as long; corolla 2–2.5 cm long, the tube 2–3 times as long as calyx tube, soft-haired outside, predominantly purple; middle lobe of lower lip almost rectangular, ca. 4 mm broad, with a yellow blotch at base and dark purple or lilac reticulate markings or a blotch covering not more than two-thirds of the surface; nutlets 2.5 mm long, 2 mm broad and 1.25 mm thick, obovoid, slightly flattened, rounded outside, 2-faced on the inside, with a rounded oblique areola, finely tuberculate, dark or brownish with black marmoreal markings. July–August.

Coppices, wood margins, felling areas, banks of streams, more rarely rubbish heaps and arable land. — European part: Lad.-Ilm., U. Dnp., M. Dnp., U. Dns. **Gen. distr.:** Centr. Eur. Described from Krakow. Type in Kiev.

Note. Natural hybrids of this species with *G. speciosa* Mill. occur. They are known under the names *G. polychroma* Beck (Fl. Niederösterr. II, 2, 1890, 1016), *G. flagrans* Porsch (in Abhandl. Zool.-bot. Ges. Wien, II, 2, 1903, 100), *G. styriaca* Porsch (l.c. 101), etc.

Hybrid derivation from *G. pubescens* and *G. tetrahit* is sometimes attributed to *G. acuminata* Rchb. (Fl. Germ. exc. 1830, 323) and *G. stricta* John (in Bot. Zeit. I, 1843, 691–692), but this is completely unfounded.

3. *G. speciosa* Mill. Gard. Dict. VIII (1768) 3; Shmal'g. Fl. II, 333; Porsch in Abhandl. Zool.-bot. Ges. Wien II, 3, 91; Kryl. Fl. Zap. Sib. IX, 2348. — *G. versicolor* Curt. Fl. londin. II (1777–1787) tab. 38. — *G. cannabina* Roth, Tent. Fl. Germ. I (1788) 254. — *G. tetrahit* β. L. Sp. pl. (1753) 580. — *G. tetrahit* δ. *grandiflora* Benth. in DC. Prodr. XII (1848) 498; Ldb. Fl. Ross. III, 421. — *G. speciosa* subsp. *speciosa* Briq. Lab. Alp. Marit. (1891) 173 et Monogr. Galeops. (1893) 286. — *G. speciosa* var. *laeta*, var. *obscura* et var. *interrupta* Porsch, l.c. 94, 96, 97. — **Ic.:** Sturm, Fl. Deutschl. ed. 2, XI, tab. 37; Rchb. Ic. Fl. Germ. XVIII, tab. 30, fig. III; Syreishch. Fl. Mosk. gub. III, 100; Porsch, l.c. tab. II, fig. 3–5, 10 et 12. — **Exs.:** Fl. exs. Austro-Hung. No. 2134; Pl. Finl. exs. No. 899.

Annual; stems to 1 m long, the swellings under nodes densely beset with coarse bristles, mostly eglandular, the internodes also mostly setiferous; leaves 3–6 (10) cm long, 1.5–3 (5) cm broad, ovate-lanceolate or rhomboid, with narrowed, rarely rounded or subcordate base, narrowly attenuate at apex, sharply or bluntly toothed (with 5–17  
117 teeth at each side), densely or sparsely appressed-hairy above and beneath; petioles 0.3–1.5 cm long, those of upper leaves sometimes winged; verticillasters rather dense, the upper subapproximate; calyx 13–17 (20) mm long, with scattered short hairs or subglabrous, the tube about as long as the teeth, these large, with enlarged foliaceous base and

glandular margins; corolla 2–3.5 cm long, the tube 3–4 times as long as calyx tube, pale yellow; upper lip rather broad, patent-haired outside, toothed at apex; middle lobe of lower lip obcordate, constricted at base, distally enlarged (to 5 mm broad), slightly emarginate, dark purple or violet, with a yellow blotch at throat; nutlets obovoid, 3–3.25 mm long, 2.25–2.5 mm broad and 1.25–1.5 mm thick, somewhat flattened, slightly rounded outside, 2-faced on the inside, with a short oblique areola, coarsely tuberculate, dark gray or brownish, black-marbled. July–August. (Plate VII, Figure 4.)

Wood margins and coppices, felling areas, rubbish heaps, truck gardens, fallow fields, arable fields (especially under summer cereals). — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don., Transv., Bes.; W. Siberia: Ob, Alt.; E. Siberia: Yenisei. **Gen. distr.:** Scand. (to 70° N. lat.), Centr. and Atl. Eur. Described from Lapland. Type in London.

Note. Concerning hybrids between this species and *G. pubescens* Bess. see note to next species.

**Economic importance.** The seeds of *G. speciosa* (like those of other *Galeopsis* species) were used until recently for extraction of oil that had technical applications (production of drying oil, polish for boots and harness). Experiments have been made to use the oil for food. It has been found to be tasty, but its consumption causes temporary paralysis of limbs, especially when the organism is heated by work. A similar effect is produced when *Galeopsis* seeds occur in large amount in cake fed to livestock. The most effective control measure is to prevent the shedding of mature seed by careful weeding of the crops and, in some places, by mowing. Mowing should be done at the onset of flowering of hempnettle and as close to the ground as possible.

4. *G. tetrahit* L. Sp. pl. (1753) 579; Ldb. Fl. Ross. III, 420, p. p. et excl. var.; Shmal'g. Fl. II, 333 p. p.; Porsch in Abhandl. Zool.-bot. Ges. Wien, II, 2, 71; Yuzepchuk in Sorn. rast. SSSR, IV, 43. — *G. reichenbachii* Reut. in Bull. Soc. Haller. II (1854) 27. — *Tetrahit* α. Benth. in DC. Prodr. XII (1848) 498. — *G. tetrahit* ssp. *genuina* Briq. Mon. 118 *Galeops.* (1893) 291. — *G. tetrahit* var. *arvensis* et var. *silvestris* Schlechtend. Fl. Berol. (1823) 320. — *G. tetrahit* var. *reichenbachii* Rapin, Guide du bot. Vand. ed. 2 (1862) 246. — *Tetrahit purpurascens* Gilib. Fl. lithuan. II (1781) 83. — *T. nodosum* Moench, Meth. pl. (1794) 395. — **lc.:** Sturm, Deutschl. Fl. XIV, tab. 982; Rchb. Ic. fl. Germ. XVIII, tab. 28, fig. III et tab. 30, fig. I; Syreishch. Fl. Mosk. gub. III, 97; Porsch, l. c. tab. I, fig. 1–3. — **Exs.:** Fl. exs. Austro-Hung. No. 2135; Pl. Finl. exs. No. 895, 896.

Annual; stem (5) 10–40, sometimes more than 50 cm long, erect, mostly branched, sturdy, inflated under nodes and covered on the swellings with retrorse bristles, these often interspersed with glandular hairs (these with large red or almost black heads), the internodes mostly with scattered bristles or subglabrous; leaves 3–8 cm long, 1.5–5 cm broad, on petiole 1 to 4 cm long, ovate-lanceolate or ovate, mostly rounded at base, acuminate, with 4 to 12 fairly long teeth at each side, hairy, mostly without sessile glands beneath; bracts lanceolate, subulate-pointed; calyx 10–12 mm long, mostly setiferous, prominently nerved; calyx teeth rigid, subulate, about as long as the tube; corolla ca. 1.5 cm long, hairy outside, the tube slightly longer than calyx teeth, mainly purple, more rarely white; upper lip oval, unevenly toothed at apex; middle lobe of lower lip quadrangular or oblong, obtuse at apex (not emarginate), 2–4 mm broad, flat, with a bright

yellow spot at throat and markings in the shape of fine-mesh purplish-brown network, covering only the basal part (not more than two-thirds of length and width of the surface); nutlets obovoid, 2.74–3 mm long, 2–2.25 mm broad and 1.25 mm thick, somewhat flattened, rounded outside, 2-faced on the inside, with a rounded oblique areola, finely tuberculate, dark gray, black-marbled, with more numerous spots than in other species of *Galeopsis* except *G. bifida* Boenn. July–August. (Plate VII, Figure 3.)

Woods and coppices, felling areas, rubbish heaps and vacant lots, roadsides, vegetable gardens, orchards, waste land, field boundaries, fallows, and arable land (especially summer crops). — European part: Kar.-Lap., Balt., Lad.-Ilim., U. V., V.-Dnp., M. Dnp., V.-Don, U. Dns. Gen. distr.: Scand., Centr. and Atl. Eur. Described from Europe. Type in London.

119 Note. The origin of this species has become in recent times the subject of experimental studies, conducted mainly by Müntzing. His studies, published in the journal *Hereditas* have become well known and have been repeatedly cited in Soviet publications. It is thought that Müntzing succeeded in obtaining a “synthetic” *G. tetrahit* as a result of crossing *G. speciosa* with *G. pubescens* and thus demonstrated its hybrid origin. *G. bifida*, a species akin to *G. tetrahit*, with a more easterly distribution area, is passed over in silence in references to Müntzing; he himself admitted in one of his papers (1930) that *G. bifida* arose in a similar manner but independently of *G. tetrahit*; he did not, however, elaborate on this subject. To begin with, having produced a large number of hybrids between *G. pubescens* and *G. speciosa*, with more or less imperfect pollen and suppressed fertility, Müntzing also obtained some small-flowered forms of low fertility, the small flowers being reminiscent of *G. tetrahit*. As regards coloring of corolla, these forms do not resemble either *G. tetrahit* nor *G. bifida* (note in particular Figures 11 and 12 in Table IV in Müntzing’s paper in *Hereditas*, Vol. XIII, 1930). Müntzing further reports that, as a result of crossing one of these forms, that was found to be triploid, with *G. pubescens* Bess., he obtained a tetraploid artifact supposedly resembling *G. tetrahit* in every respect; this was described in a separate paper (*Hereditas*, Vol. XVI, 1932). However, the frontal photographic pictures of flowers of 32 specimens of this artifact show that, considering the extreme variability of the displayed material, the flowers have but a remote and vague resemblance to those of *G. tetrahit*. The occurrence of resemblance in regard to other characters is not documented if one disregards the rather uninformative representations of flowers of eight specimens in side view and the quite unsatisfactory photographs of the upper part of internodes where details of indument are not distinguishable; leaves of the artificial “*G. tetrahit*” are not shown. Thus Müntzing’s assertion that the above-mentioned triploid plant and its tetraploid progeny do not differ morphologically from genuine *G. tetrahit* is insufficiently substantiated and manifestly exaggerated. It should also be noted that Müntzing did not obtain anything resembling *G. bifida* and one obviously cannot convincingly discuss the origin of one of the two kindred tetraploid species while ignoring the other.

**Economic importance.** See under *G. speciosa* Mill. The seeds contain 43.33% fat. A nectariferous plant.



5. *G. bifida* Boenn. Prodr. Fl. Monast. (1824) 178; Porsch in Abhandl. Zool.-bot. Ges. Wien, II, 3, 86; Yuzepchuk in Sorn. rast. SSSR, IV, 44; Kryl. Fl. Zap. Sib. IX, 2347. — *G. tetrahit* var. *bifida* lej. et Court. Compend. fl. Belg. II (1831) 239. — *G. tetrahit* ssp. *bifida* Fries, Novit. fl. suec. mant. alt. (1839) 38; Briq. Mon. Galeops. 301. — *G. tetrahit* auct. plur. Fl. Ross. Eur. saltem pro parte et auct. omn. fl. Cauc. Sibir. Orient. Extr. — *G. tetrahit*  $\beta$ . *parviflora* Benth. in DC. Prodr. XII (1848) 498; 120 Ldb. Fl. Ross. III, 1, 421. — *G. perhofferi* Wettst. in Kerner, Fl. exs. Austro-Hung. (1892) No. 2138. — Ic.: Rchb. Ic. fl. Germ. XVIII, tab. 29, 1; Porsch, l. c. tab. II, fig. 1–2 et 11; Syreishch. Fl. Mosk. gub. III, 101. — Exs.: Fl. exs. Austro-Hung. No. 2137; Pl. Finl. exs. No. 897, 898.

Annual, mostly smaller and more slender than *G. tetrahit* L., 15–45 cm high; stem swellings under nodes very densely covered with retrorse bristles; other parts of internodes also rather densely setiferous; glandular hairs absent or distributed over the whole length of internode, with red or yellow head; leaves 5–9 cm long, 1–3.5 (5) cm broad, on petiole (2) 5–10 (13) mm long, lanceolate or ovate-lanceolate, attenuate at base, acute or acuminate at apex, marginal teeth 5–15 at each side, smallish, short, approximate, obtusish; both sides of leaf covered with rather scattered appressed white hairs, the lower side more copiously hairy and often profusely glandular; verticillasters rather dense; bracts linear-lanceolate or oval-lanceolate, 5–6 mm long, somewhat scarious at base (ca. 2 mm broad), subulate-pointed; calyx (10) 13–15 mm long, covered with divaricate bristles, the teeth about as long as the tube; corolla small, 10–14 (15) mm long, mostly purple, rarely sulfureous or almost white, the tube slightly exceeding calyx; upper lip oval, obtusely rounded at apex, with 3–9 unequal blunt teeth; middle lobe of lower lip oblong, scarcely broader than the lateral lobes, 1–2 mm broad, constricted at base, distinctly emarginate, at length revolute-margined, with yellow blotch at base and markings consisting of 3 parallel thickish dark purple or dark lilac lines reaching the end of the lobe and connected by transverse streaks, the markings often with a solid background of a lilac-purple blotch covering all but a narrow light rim, sometimes the blotch so dark that lines are almost indiscernible and then the markings of lower lip resembling those of *G. speciosum*; nutlets not distinguishable from those of *G. tetrahit*. July–August. (Plate VII, Figure 2.)

- In same habitats as the preceding species. — European part: Kar.-Lap., Dv.-Pech., Balt., Lad.-Ilm., U.V., V.-Kama, U.Dnp., M.Dnp., V.-Don., Transv., Bl. (?), Crim., L.Don., U.Dns.; 123 Caucasus: throughout; W. Siberia: throughout; E. Siberia: throughout. Far East: Ze.-Bu., Uda., Uss., Sakh.; Centr. Asia: T. Sh. (Przheval'sk). **Gen. distr.:** Scand. (S. part), Centr. Eur., Mong. (N. part), N. Japan; adventive in N. America. Described from Westphalia. Type probably in Münster.

Note. This outstanding species was long confounded in the USSR with *G. tetrahit* and was believed to be very poorly represented in the flora of countries that now form part of the Soviet Union. Ledebour, in "Flora Rossica" mentions only 4 locations for this species (III, 422). According to Schmalhausen (Fl. II, 333) it occurs but "rarely" in the Lifland, Saratov and Kherson provinces. According to Syreishchuk, it was found "only once by A. A. Khoroshkov near Uspenskii Zvn. y. (Fl. Mosk. gub. III, 101). It was not mentioned at all by Krylov (Fl. Altaya, IV, 1058) for Altai or by Grossheim (Fl. Kavk. III, 303) for the Caucasus. P. L. Perlova, in a special paper dealing with variability of *G. tetrahit* (in Tr. petergofsk, est.-nauchn. inst., No. 8, 1932), did not distinguish this species, etc., etc.



PLATE VII. 1 – *Galeopsis ladanum* L., general aspect, flower; 2 – *G. bifida* Boenn., general aspect, flower; 3 – *G. tetrahit* L., leaf, flower; 4 – *G. speciosa* Mill., flower.

Our studies concerning the distribution of this species on USSR territory, the results of which were largely published in the report "Sornye rasteniya SSSR" (Weed Plants of USSR), IV, 1935, 44—45, and were indicated on sheet 85 in the atlas entitled "Raiony rasprostraneniya vazhnykh sornykh rastenii v SSSR" (Distribution areas of important weed plants in the USSR), 1935, have shown, however, that *G. bifida* is the most widely distributed and commonest species of *Galeopsis* in the flora of the USSR and apparently replaces the outwardly similar *G. tetrahit* in the eastern section of the European part of USSR, in the Caucasus, in the Crimea, in Soviet Central Asia, in Siberia and in the Far East. In the western parts of the U.S.S.R. the areas of *G. tetrahit* and *G. bifida* overlap and the two species grow side by side. Hybrids between the two species occur, however, rather rarely, and the fertility of such hybrids is on the whole depressed and the pollen is very imperfect. Hybrids of this kind were named *G. ludwigii* Hausskn. (in Mitteil. des bot. Vereins für Gesamtthüring. 1884, 8). We leave open the question to what extent the partial mutual replacement of these species reflects their kinship. In our view, this kinship is not very close and the two species can hardly be included in the same "series"; they certainly cannot be regarded as subspecies of the same species, as proposed by Briquet. Most likely they are of altogether different origin and their similarity, consisting chiefly in the small size of corolla, is the result of convergence. In conformity with the already mentioned systematics of the subgenus, proposed by Porsch, it may be assumed that *G. tetrahit* is more closely related to *G. pubescens* Bess., while *G. bifida* and *G. speciosa* represent depauperate but more resistant derivatives either directly descendent from the former 124 or from some intermediate forms. See also general note to subgenus *Tetrahit*.

**Economic importance.** See under *G. speciosa* Mill.

## Genus 1269.\* *Lamium*\*\* L.

L. Sp. pl. (1753) 579. — Pollichia Schrank in Acta Erf. III (1781) 35. — *Lamiopsis* Opiz, Seznam (1852) 56

Flowers bisexual, mostly numerous, sessile, gathered in verticillasters in the axils of upper leaves; bracts linear or subulate, shorter than calyx; calyx tubular or campanulate, 5—10-nerved, oblique or straight, mostly hairy; calyx teeth 5, subulate, subequal or the upper sometimes longer; corolla purple, rarely white, pubescent outside, the tube exserted, rarely included in calyx, long and straight, sometimes more or less curved, dilated at throat, glabrous inside or with a ring of hairs; upper lip hooded, simple or 2-parted, often attenuate at base; lower lip 3-lobed, the middle lobe larger, reniform, mostly emarginate, rarely bifid or entire, the lateral lobes small, with short appendages; stamens 4, exserted, nearly parallel, the lateral longer than the median; anthers 2-celled, glabrous or hirsute; style with 2-lobed stigma, the subulate lobes equal; nutlets obovoid, obtusish at apex, sharply triangular in cross-section, smooth

\* Treatment by S. G. Gorshkova.

\*\* From Greek lamia, a fish, alluding to the toothed throat of corolla resembling the mouth of a fish.



or white-tuberculate. Herbs; lower leaves petiolate, with doubly dentate or incised-dentate margin; upper leaves mostly sessile, often exceeding the flowers.

Forty species distributed in Europe, North America and extratropical Asia. Twelve species in the USSR.

1. Corolla tube cylindrical, straight, glabrous inside or occasionally with a transverse ring of hairs, dilated at throat . . . . . 2.
- + Corolla tube cylindric and straight at base, with a ring of hairs inside, dilated above it, almost inflated more or less enlarged at throat . . . . . 8.
2. Perennials, glabrous (except corolla); leaves broad-ovate or reniform, dissected nearly to base into 5 (rarely 3) obovate segments, these cut into 3 or more lobes; petioles (0.3) 1–2.4 cm long; verticillasters 6-flowered; bracts half the length of calyx; corolla tube glabrous inside; upper lip deeply parted, nearly 2-lobed; middle lobe of lower lip obcordate, deeply emarginate, the lateral lobes with one appendage each . . . . . 1. **L. glaberrimum** (C. Koch) Taliev.
- + Annuals and biennials . . . . . 3.
3. Corolla 1.4–2 cm long, the upper lip emarginate or entire; annual plants . . . . . 4.
- + Corolla 0.6–1.6 cm long, the upper lip entire, rarely emarginate; annual or biennial plants . . . . . 5.
4. Upper leaves reniform, crenate-incised; corolla tube often 3 times as long as calyx, glabrous inside; upper lip entire; lower lip slightly longer; lateral lobes of lower lip with one appendage each . . . . . 2. **L. amplexicaule** L.
- + Upper leaves reniform, incised to 1/2 or to 2/3; corolla tube twice as long as calyx, with interrupted ring of hairs; upper lip retuse; lower lip shorter than the upper; lateral lobes of lower lip with two appendages each . . . . . 3. **L. paczoskianum** Vorosch.
5. Corolla purple, the tube without a ring of hairs; leaves deeply incised-dentate; petioles broad, almost winged, 3–5 mm long . . . . . 7. **L. hybridum** Vill.
- + Corolla light purple or pink, rarely white, the tube with a ring of hairs; leaves with rounded teeth, very rarely incised; petioles 0.5–3.5 cm long, narrow . . . . . 6.
6. Verticillasters 2–3-flowered; corolla pink-purple or pink; upper lip oblong, 1.5 mm broad, emarginate; plants 6–12 cm high . . . . . 4. **L. ordubadicum** Grossh.
- + Verticillasters 6–10-flowered; corolla purple, sometimes pink or almost white; upper lip oblong or ovate, entire; plants 10–30 (70) cm high . . . . . 7.
7. Corolla purple, 1.3–1.6 (2) cm long; middle lobe of lower lip sometimes with few lilac speckles; plants to 30 (70) cm high . . . . . 5. **L. purpureum** L.
- + Corolla light pink or sometimes almost white, 0.6–1 cm long; plants to 20 cm high . . . . . 6. **L. caucasicum** Grossh.
8. Plants (5) 10–20 (25) cm high, softly tomentose; corolla densely white-pubescent outside; upper lip entire, obtuse, finely toothed . . . . . 8. **L. tomentosum** Willd.
- + Plants 20–80 (140) cm high, more or less hairy or glabrous; corolla pubescent, the upper lip mostly emarginate . . . . . 9.

- 126 9. Corolla pink-purple, rarely raspberry-colored; lower lip spotted, the lateral lobes with one subulate curved appendage; stems prostrate at base; leaves sometimes with light-colored spots . . . . . 12. *L. maculatum* L.  
 + Corolla white, ochroleucous or pale pink; stems erect; leaves not spotted . . . . . 10.  
 10. Verticillasters 4–14-flowered; bracts narrowly linear or filiform, one-third the length of calyx; corolla pale pink, with narrow upper lip . . . . . 11. *L. barbatum* Sieb. et Zucc.  
 + Verticillasters 8–9-flowered; bracts linear, one-sixth the length of calyx; corolla white or ochroleucous . . . . . 11.  
 11. Stems sparsely covered with long spreading hairs, sometimes glabrous; leaves covered with scattered long hairs, the middle and upper leaves with cordate base; corolla white, the tube mostly shorter than limb . . . . . 9. *L. album* L.  
 + Stems glabrous below, in upper part rather densely covered with short hairs, middle and upper leaves with short-coneate base; corolla ochroleucous, the tube longer than limb . . . . . 10. *L. dumeticola* Klok.

Subgenus 1. *Eulamium* Aschers. in Aschers. u. Graebn. Fl. des Nordostdeutsch. Flachl. (1898–1899) 599. — Corolla purple, pink or white, the tube straight or sometimes curved, glabrous inside or with a transverse ring of hairs; lateral lobes of lower lip with one or more appendages, rarely unappendaged; anthers hairy.

Section 1. *Pollichia* (Schrank) Briq. Lab. in Pflanzenfam. IV, 3a, 4b (1897) 254. — *Pollichia* Schrank in Acta Erf. III (1781) 35. — *Lamiopsis* Opiz, Seznam. (1852) 56. — Corolla tube regular, cylindrical, not narrowing at base, glabrous inside or sometimes with a transverse ring of hairs, dilated at throat; anthers hairy.

Subsection 1. *Garganica* Briq. in Pflanzenfam. IV, 3a, 3b (1897) 255. — Corolla 3–3.8 cm long, the tube glabrous inside, upper lip emarginate, rarely entire, lateral lobes of lower lip with one appendage each. Perennial plants.

1. *L. glaberrimum* (C. Koch) Taliev in Izv. Peterb. bot. sada, II, 1 (1902) 36. — *Lagochilus glaberrimus* C. Koch in Linnaea, XXI (1848) 679. — Ic.: Taliev, op. cit. 132, 136.

Perennial, 20–30 cm high, glabrous except corolla; stems numerous, prostrate, leafless and reddish-violet at base, erect, leafy and mostly green above; lower leaves broad-ovate or reniform, 0.5–1 (1.6) cm long, 1–2 cm broad, dissected nearly to base  
 127 into 5 (rarely 3) obovate segments, these cut in turn into 3 or more lobes; petioles 1–2.4 cm long; upper leaves 1–1.5 cm long, 1–1.4 cm broad, about half the length of flowers, less deeply incised, with broader lobes, sessile or tapering into cuneate petiole

3–6 mm long; verticillasters 6-flowered, distant; bracts linear-lanceolate or almost subulate, 5–8 mm long; calyx obconical, 1.1–1.5 cm long, 5-nerved, glabrous, strongly accrescent in fruit, the tube 1 cm long, the teeth lance-subulate or triangular-lanceolate, 4–5 mm long, about half the length of the tube; corolla pink (2.2) 3–3.5 cm long, pubescent outside, the tube (1.7) 2–2.5 cm long, glabrous inside, expanded at throat; upper lip 1 cm long, elongated, deeply parted into 2 lobes; middle lobe of lower lip larger, 4 mm long, 4 mm broad, obcordate, deeply emarginate, the lateral lobes 3 mm long, with 1 subulate appendage each; filaments ciliate; anthers hairy; nutlets obovoid, trigonous, 3–3.5 mm long, 2 mm broad, grayish-brown, smooth. May–July.

Stony screes in the lower cultivated mountain belt and wood margins. — European part: Crim. (national forest). Endemic. Described from the forest preserve. Type in Leningrad.

Note. A rare plant of the mountains of Crimea, first collected by V.I. Taliev near Koz'mo-Dem'yansk Monastery (now the Crimean national preserve) in 1899 and was mentioned by him in a description in 1902 as being analogous to the dubious *Lagochilus glaberrimus* Koch. Considering the incomplete description (without more precise indication of location) and the fact that this Crimean plant has not since been found by anybody, Taliev assumed that it had been wrongly referred by Koch to the genus *Lagochilus* and considered it more appropriate to refer it, as well as the plant collected by himself, to the genus *Lamium*.

*L. glaberrimum* Taliev differs markedly from *Lagochilus* in having an obconical calyx, with lance-subulate teeth, and a corolla with long distally dilated tube, hooded upper lip, the middle lobe of lower lip being obcordate, deeply emarginate, the lateral lobes with one almost subulate appendage each. Various locations have been reported for *L. glaberrimum*, at plant favoring screes with relatively large stones: in Crimea in the national preserve area (Stankov, Poplavskaya), in the Yalta district (Zelenetskii) and in Dzanum Bogei (Visnovskaya).

Subsection 2. *Amplexicaulia* Briq. in *Pflanzenfam.* IV, 3a, 3b (1897) 255. — Corolla 1.4–2 cm long, the tube glabrous inside or with an interrupted ring of hairs; upper lip emarginate or entire; lateral lobes of lower lip with 1 or 2 appendages each; annual plants.

- 128 2. *L. amplexicaule* L. Sp. pl. (1753) 579; Turcz. Fl. baic.-dah. II, 403; Ldb. Fl. Ross. III, I, 427; Boiss. Fl. or. IV, 760; Shmal'g. Fl. II, 337; Kom. Fl. Man'chzh. III, 463; Grossg. Fl. Kavk. III, 304; Kryl. Fl. Zap. Sib. IX, 2350. — *Pollichia amplexicaulis* Willd. Fl. Berol. (1787) 198. — *Galeobdolon amplexicaule* Moench, Meth. pl. (1794) 393. — Ic.: Fedch. and Fler. Fl. Rvrop. Ross. Fig. 727; Syreishch. Fl. Mosk. gub. 2, III, 92; Fl. Yugo-Vost. VI, Fig. 610; Sorn. rast. SSSR, IV, Fig. 390, 7. — Exs.: GRF, No. 1181; Fl. Pol. exs. No. 231; Pl. Finl. exs. No. 337; Fl. siles. exs. No. 436.

Annual or biennial, (4) 10–20 (30) cm high, glabrous or covered with white appressed hairs; stems mostly numerous, ascending, more or less branching at base;



leaves orbicular or rounded-reniform, asymmetrical, crenate-incised with rounded teeth, 1–3.5 cm long, 0.7–2 (3.5) cm broad, on petiole 1–3 cm long; upper leaves sessile, reniform, half-clasping, deeply crenate, 0.7–1 (1.8) cm long, 1 (1.5)–2.5 cm broad, exceeding the calyx; all leaves subglabrous or hispidulous; verticillasters 6–10-flowered, the upper approximate; bracts lance-subulate, 1.5–2 mm long, 0.3 mm broad, ciliate, two-fifths to half the length of calyx; calyx campanulate, oblique, 4–5 mm long, 1.7–2 mm broad, covered with straight appressed white hairs, the teeth lance-subulate, 2 mm long, about as long as the tube, ciliate-margined, connivent in fruit; corolla purple or pink, (1.5) 1.8–2 (2.3) cm long, pubescent outside, sometimes incompletely developed and included in calyx (var. *clandestinum* Rchb.); tube slender, 1.1–1.3 cm long, straight or sometimes more or less curved, expended at throat, glabrous inside; upper lip oblong or ovate, 2–3 mm long, obtuse; lower lip slightly longer than the upper, with dark speckles, the middle lobe obcordate, emarginate, contracted at base, the lateral lobes small, each with one obtuse appendage; filaments glabrous; anthers hispid; nutlets obovoid, 2–3 mm long, 1 mm broad, subtrigonus, light gray or brown, the surface with large white tuberclelike excrescences. April–October.

Flood plains, grass plots and wood margins; as weed in cultivated fields and truck gardens, at roadsides and near dwellings. — European part: Kar.-Lap., Dv.-Pech., Balt., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bes., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., W. E. and S. Transc., Tal.; W. Siberia: Ob., U. Tob.; E. Siberia: Ang.-Say., Dau.; Far East: Uss. (Vladivostok, a weed); Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., Kara K., U. Turkm., Amu D., Syr D., Pam.-Al., T. Sh. Gen. distr.: Scand., Centr. and Atl. Eur., Med., Iran, Ind.-Him., Japan and China. Described from Europe. Type in London.

- 129 3. *L. paczoskianum* Vorosch. in Byull. Mosk. obshch. isp. prir. LII, 3 (1947) 50, nom. nov. — *L. amplexicaule orientale* Pacz. Florogr. i Fitogeogr. issled. Kalm. step. (1892) 103. — *L. orientale* (Pacz.) Litwinenko in Maevsk. Fl., ed. 7 (1940) 617, non Krause in Sturm, Deutschl. Fl. ed. 2, XI (1903) 137. — *L. orientale* (Pacz.) Schost in Bot. mat. gerb. Bot. inst. AN SSSR, VIII, 9 (1940) 151. — *Wiedemannia multifida* Ldb. Fl. Ross. III, 1 (1847–1849) 426, non Benth.; Fedch. and Fler. Fl. Evrop. Ross. 816; Bobrov in Izv. Glavn. bot. sada, XXVI, 2, 174.

Annual; stems erect or ascending, often rather weak, (7) 10–30 (36) cm long, sometimes branching from base, sparsely covered with short white appressed hairs; lower leaves rounded-ovate, 0.7–1 (1.3) cm long, 0.7–1.3 (2) cm broad, incised-crenate, asymmetrical, on petiole 0.5–1.8 cm long; upper leaves reniform or orbicular, 1.2–1.5 (2.3) cm long, 1.8–2–2.4 cm broad, spatulately parted, subsessile, half-clasping; all leaves sparsely covered with short straight white hairs; verticillasters 6–10-flowered, distant, the upper approximate; bracts filiform-subulate, 1.5–2 (2.5) mm long, one-fourth to one-third the length of calyx, subacute; calyx campanulate, pubescent, 5–6 mm long, 1.5 mm broad, the teeth lance-subulate, 1–2.5 mm long, ciliate-margined; corolla pink, 1.2–1.5 cm long, 2–3 times as long as calyx, pubescent outside, the tube slender, straight, 1 cm long and 1 mm broad, dilated at throat, with an interrupted ring of hairs inside; upper lip oblong, 3.5–5 mm long, 2.5–3 mm broad, retuse; lower lip shorter than the upper, 3–4 mm long, the middle lobe obcordate, 3 mm long, 3 mm broad, narrowing at base to a claw,

deeply emarginate, the lateral lobes with 2 obtuse appendages each; filaments glabrous; anthers hairy; nutlets obovoid or ellipsoid, 2 mm long, 1 mm broad, trigonous, brown or light cinnamon-brown, with white tuberclelike excrescences. May–September.

Scrub, on stony sandy slopes, in orchards. — European part: V.-Kama (S.), M. Dnp., V.-Don., Transv., Bl., L. Don., L. V.; Centr. Asia: Ar.-Casp. (Mugodzhary). Described from Lake Baskunchak. Type in Leningrad.

Subsection 3. *Purpurea* Briq. in Pflanzenfam. IV, 3a, 3b (1897) 255. — Corolla 0.6–1.6 cm long, the tube with a ring of hairs inside, rarely glabrous; upper lip entire, rarely emarginate; lateral lobes of lower lip with one appendage each. Annuals or biennials.

4. *L. ordubanicum* Grossh. in Beih. Bot. Centralbl. XLIV, 2 (1927) 236; Grossg. Fl. Kavk. III, 304 and Opred. rast. Kavk. 335.

- 130 Annual, 6–12 cm high, sparsely pubescent; stem erect, slender, simple or sparingly branching; lower leaves ovate-orbicular, 0.5–1.3 cm long, 0.5–1.3 cm broad, glabrous, obtuse, the margin with rounded teeth, on petiole 0.6–1.5 cm long; upper leaves dense, rhomboid-ovate, cuneate at base, incised-crenate, 1.4–2.4 cm long, 0.8–2 cm broad, exceeding the flowers, sessile, glabrous beneath, covered above with appressed white hairs; verticillasters dense, 2–3-flowered, the lower subdistant; bracts linear-lanceolate, subulate, 3 mm long, pubescent, the margin ciliate; calyx campanulate, 7.5–8 mm long, densely pubescent, somewhat shorter than corolla, the tube 3.5 mm long, the teeth lanceolate, long-subulate, 4 mm long, mostly reddish, ciliate-margined; corolla pink or purple, 0.9–1 cm long, pubescent outside, the tube 6–7 mm long, expanded at throat, with a ring of hairs inside; upper lip narrowly oblong, 2–2.5 mm long, 1.5 mm broad, emarginate; middle lobe of lower lip obcordate, 1 mm long, 1.5 mm broad, attenuate at base, deeply incised at apex; lateral lobes small; filaments pubescent; anthers hairy; nutlets obovoid, trigonous, 2.5–3 mm long, 1.5 mm broad, fuscous, sparsely covered with small irregularly shaped white excrescences. May–June.

Mountains in the alpine zone, on screes at an altitude of 2700 m. — Caucasus: S. Transc. **Gen. distr.:** Ar.-Kurd. Described from Mount Soyukh, above Ordubad. Type in Leningrad.

5. *L. purpureum* L. Sp. pl. (1753) 579; M. B. Fl. taur-cauc. II, 47; Ldb. Fl. alt. II, 407 et Fl. Ross. III, 1, 428; Boiss. Fl. or. IV, 766; Shmal'g. Fl. II, 337; Grossg. Fl. Kavk. III, 304; Kryl. Fl. Zap. Sib. IX, 2350. — *L. hybridum* Vill. Hist. Pl. Dauph. I (1786) 251, p. p. — *L. incisum* Willd. Sp. pl. III (1800) 89, p. p.; Ldb. Fl. Ross. III, 1, 428; Shmal'g. op. cit. 337. — **lc.:** Fedch. and Fler. Fl. Evrop. Ross. 815; Syreishch. Fl. Mosk. gub. III, 92; Maevsk. Fl. ed. 7, Fig. 255. — **Exs.:** GRF, No. 1084; Fl. Pol. exs. No. 560a et 560b; Fl. Gall. et Germ. exs. No. 1297; Fl. Boh. et Mor. exs. No. 887; Pl. Finl. exs. No. 1296, 1297 et 892.

Annual or biennial, more or less pubescent, (5) 10–30 (70) cm high; stems decumbent or more or less ascending, erect, branching at base, the internodes shining, sometimes dark purple; lower leaves ovate-cordate or orbicular, 1–3 cm long, 1–2 cm broad, subobtusate, on petiole 1.5–3.5 cm long; upper leaves ovate, short-acuminate, on petiole 2–5 mm long or subsessile, mostly lilac-purple, exceeding the flowers; all leaves rugose, with crenate or rounded-dentate margin, subglabrous beneath, covered above with short soft appressed white hairs; verticillasters 6–10-flowered, the upper 131 approximate, the lower distant; bracts 3–3.5 mm long, two-fifths to half the length of calyx, the margin ciliate; calyx campanulate, 7–9 mm long, 1.5 mm broad, half the length of corolla, glabrous or sparsely hairy, mostly lilac or lilac-purple, the tube 4 mm long, the teeth lanceolate, long-subulate, 4–5 mm long, about as long as or slightly longer than the tube, spreading in fruit; corolla light-purple or sometimes pink, 1.3–1.6 (2) cm long, pubescent outside, the tube cylindrical, slender, straight, 1–1.3 cm long, 1.5 mm broad, expanded at throat, with a ring of hairs inside; upper lip oblong or ovate, 3.5–4 mm long, mostly as long as or slightly longer than the lower lip, almost straight, entire; middle lobe of lower lip larger, 2 mm long and as broad, obreniform, emarginate, attenuate at base to a short claw, sometimes with few lilac speckles, the lateral lobes small, broad, short, with one lance-linear appendage; filaments almost smooth; anthers hairy in upper part; nutlets obovoid, 2–2.5 mm long and 1–1.3 mm broad, subtrigonal, gray or light-gray, with sparse small white excrescences of irregular shape. April–October.

Mixed, deciduous, oak-and-horbeam, and oak forests, coppices, wood margins, mountain slopes, sometimes as an adventive weed. — European part: Kar.-Lap., Dv.-Pech., Balt., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don., U. Dns., Bes., Bl., Crim., L. Don. (Novocherkassk); Caucasus? Cisc., Dag., W., E. and S. Transc.; W. Siberia: Ob. (Tomsk district), U. Tob. (vicinity of Tobol'sk and Turinsk), Alt. (Zmeinogorsk district); E. Siberia: Yenisei, Lena-Kol. **Gen. distr.:** Scand. (except N.), Centr. Eur., Atl. Eur., Med., Bal.-As. Min., Iran. (N.), Japan, N. Am. (Canada). Described from Europe. Type in London.

**Economic importance.** A good honey plant, each flower yielding 1–1.5 mg nectar with a sugar content of 15–17% (according to Grossheim).

6. *L. caucasicum* Grossh. in Izv. Azerb. FAN SSSR, 10 (1944) 39; Grossg. Oprod. rast. Kavk.335.

Annual, almost glabrous; stems often numerous, weak, erect or ascending, to 20 cm long; lower leaves ovate-orbicular or triangular-ovate, 0.8–1 cm long, 1 cm broad, obtuse, crenate or rounded-dentate, on petiole 1.3–2 (3–4) cm long; upper leaves triangular-ovate, 1–2 cm long, 1–1.7 cm broad, exceeding the flowers, subacute, subsessile or with petiole 0.5–1 cm long; verticillasters 6–10-flowered, gathered in heads, approximate, the lower sometimes distant; bracts linear-subulate, 1.8 mm long, 0.2 mm broad, ciliate-margined, one-third to one-half the length of calyx; calyx campanulate, 5–6 mm long, subglabrous or sparsely hairy, the teeth lanceolate, acuminate, 132 3.5 mm long and 0.5 mm broad, ciliate-margined, spreading in fruit, longer than tube; corolla light pink or almost white, 0.6–1 cm long, equaling to twice as long as calyx,



covered outside with white hairs, the tube straight, cylindric, 4 mm long, 2 mm broad, dilated at throat, with a ring of hair inside; upper lip straight, oblong-ovate, 2.5 mm long, 2 mm broad, entire, ciliate; lower lip 3-parted, as long as or slightly shorter than the upper lip, the middle lobe obreniform, 1.5 mm long, 1.3 mm broad, attenuate at base, deeply emarginate, the lateral lobes small, broad, each with one appendage 0.5 mm long; filaments glabrous; anthers hairy in upper part; style with 2-parted stigma; nutlets obovoid, 1.5–2 mm long, 0.7–1 mm broad, brown, the surface sparsely covered with irregularly shaped whitish accrescences. May.

Forests and coppices. — Caucasus: Cis., Dag., E. Transc. Endemic. Described from Krtsanisi, near Tbilisi. Type in Baku.

7. **L. hybridum** Vill. Hist. Pl. Dauph. I (1785) 251; Ikon. in Maevsk. Fl. ed. 7, 618. — **L. incisum** Willd. Sp. pl. III (1800) 89, p. p.; Ldb. Fl. Ross. III, 1, 428; Shmal'g. Fl. II, 337. — **lc.**: Syreishch. Fl. Mosk. gub. III, 93. — **Exs.**: Pl. Finl. exs. No. 338 et No. 894; Fl. Gall. et Germ. exs. No. 1743.

Annual, glabrous or more or less pubescent, sometimes reddish, 5–45 cm high; stem branching from base, erect, ascending, mostly covered, as are the leaves, with sparse white hairs; lower leaves reniform, orbicular or rhombic, 1.5–3.5 cm long, 1.4–3.3 (3.5) cm broad, obtuse, the margin deeply and unevenly incised-dentate, the petiole 1.3–4 (7) cm long; upper leaves occasionally purple, subrhombic, 1.3–4.5 cm long, 1–4.3 cm broad, approximate, often exceeding the flowers, obtusish, with unevenly dentate margin, the petiole 3–5 mm long; verticillasters dense, the upper approximate; bracts linear-subulate, 2–2.5 (3) mm long, about as long as calyx tube or slightly shorter; calyx campanulate, hairy, sometimes suffused with reddish-purple, 6 mm long, the tube 3–4 mm long, the teeth linear-subulate, 2–3 mm long, ciliate, spreading in fruit; corolla 1.2 cm long, purple, pubescent outside, the tube straight, 3–4 mm long, expanded at throat, without a ring of hairs; upper lip oblong, entire, obtuse, 3.5–4 mm long, 3 mm broad; middle lobe of lower lip larger, obreniform, 1.5–2 mm long, 2 mm broad, narrowing to a short claw, emarginate, the lateral lobes broad, 1 mm long, each with one appendage 0.2 mm long; filaments glabrous; anthers hairy in upper part; nutlets obovoid, 2 mm long, 1 mm broad, trigonous, brownish-gray, sparsely covered with scattered small white excrescences. May–June.

A weed in orchards and truck gardens. — European part: Kar.-Lap., Balt., Lad.-Ilm., U. V., V.-Kama, M. Dnp., U. Dns., Bl. **Gen. distr.**: Scand., Centr. Eur. Described from W. Europe. Type in London.

Note. Probably a hybrid between *L. amplexicaule* and *L. purpureum*.

Section 2. **Lamiotypus** Dumort. Fl. Belg. (1827) 45. — Corolla tube with a ring of hairs inside, cylindric at base, compressed under the ring, frontally expanded above the ring, mostly almost inflated, slightly dilated at throat.

Series 1. *Tomentosa* Gorschk. — Perennial, densely pubescent plants of high mountains; upper lip of corolla finely toothed; lateral lobes of lower lip each with one subulate appendage.

8. *L. tomentosum* Willd. Sp. pl. III, 1 (1800) 90; M. B. Fl. taur.-cauc. III, 396; Ldb. Fl. Ross. III, 1, 430; Boiss. Fl. or. IV, 764; Grossg. Fl. Kavk. III, 305. — *L. filicaule* Boiss. ex DC. Prodr. XII (1848) 507; Boiss. Diagn. ser. I, 12, 86. — *L. alpestre* Trautv. in Tr. Bot. sada, II (1873) 481. — Exs.: GRF, No. 685.

Perennial, 10–25 cm high or 5–6 cm high (var. *filicaule* Boiss.), all softly tomentose or almost glabrous (var. *alpestre* (Trautv.) N. Pop.); stems mostly numerous, often slender (var. *filicaule* Boiss.), sometimes reddish, decumbent, glabrous, ascending; weak, sometimes curved, pubescent; lower leaves ovate, suborbicular, 1–1.5 (3.5) cm long and as broad, obtusish, cordate at base, rugose, the margin coarsely and bluntly dentate or crenate-serrate, the petiole 0.5–1.5 (2) cm long; upper leaves mostly oblong-ovate or ovate, 1–2 (4) cm long and broad, subacute, obtusely toothed, about half the length of the flowers, sessile or on petiole 3 mm long; all leaves densely pubescent or subglabrous (var. *alpestre* (Trautv.) N. Pop.); flowers numerous, in 6–8-flowered verticillasters; bracts lance-subulate, 2.5–3 mm long, pinnate; calyx campanulate, 1 cm long, densely white-tomentose or slightly pubescent (var. *alpestre* (Trautv.) N. Pop.), the teeth triangular (var. *filicaule* Boiss.) or lance-subulate, 2.5–3 mm long, with ciliate margin; corolla pink or almost white (var. *alpestre* (Trautv.) N. Pop.), 2.5 cm long, densely white-pubescent, the tube slender, 1.5 cm long, 2.5 mm broad; upper lip obovate or oblong, 8–9 mm long, 7 mm broad, obtuse, finely toothed; middle lobe of lower lip reniform, larger, 6–7 mm long and as broad, contracted at  
134 base, deeply emarginate, the lateral lobes small, with subulate appendage 1 mm long; filaments subglabrous; nutlets obovoid, trigonous, 3 mm long, 2–2.5 mm broad, grayish-brown, smooth. June–July.

In mountains up to 3200 m, meadows, screes, rocks and moraines. Caucasus: Cisc., Dag., W., E. and S. Transc. Gen. distr.: Arm.-Kurd., Iran. Described from Armenia. Type in London.

Series 2. *Alba* Gorschk. — Perennials, more or less hairy; corolla ochroleucous or pinkish-white; upper lip entire; lower lip speckled only at base, the lateral lobes with one subulate or filiform appendage.

9. *L. album* L. Sp. pl. (1753) 579; Bge. in Ldb. Fl. alt. II, 406; Turcz. Fl. baic.-dah. II, 404; Ldb. Fl. Ross. III, 1, 429; Boiss. Fl. or. IV, 763; Shmal'g. Fl. II, 325. — Grossg. Fl. Kavk. III, 305; Kryl. Fl. Zap. Sib. IX, 2351. — *L. vulgatum*  $\beta$ : *album* Benth. Lab. Gen. et sp. (1832–1836) 514. — *L. turkestanicum* Kuprian. in Bot. mat. gerb. Bot. inst. AN SSSR, XIV (1951) 343. — *L. brachyodon* (Bordz.) Kuprian. op. cit. 345. — Ic.: Varlikh, Russk. lek. rast. IV, Plate 101; Fedch. and Fler. Fl. Evrop. Ross. Fig. 730; Syreishch. Fl. Mosk. gub. III, 95; Fl. Yugo-Vost. Fig. 611; Sorn. rast. SSSR, IV, Fig. 393; Maevsk. Fl. ed. 7, Fig. 254; Kupriyan, op. cit. Fig. 1

and 2. — Exs.: GRF, No. 1492<sup>a</sup> and 1492<sup>b</sup>; Fl. Pol. exs. No. 230; Fl. Boh. et Mor. exs. No. 888; Fl. exs. Austro-Hung. No. 2646; Fl. Ital. exs. ser. II, No. 1943; Fl. Gall. et Germ. exs. No. 2515; Pl. Finl. exs. No. 339.

Perennial, with creeping rhizome (10) 30–140 cm high, sparsely covered with spreading soft whitish hairs; stem erect, simple or sparingly branched; leaves ovate or cordate, (2) 3–8 (10) cm long, 1.5–5 (8) cm broad, more or less rugose, rarely hairy, attenuate at base, the margin sharply serrate, the petiole 1–2 (4) cm long; upper leaves similar, with petiole 0.2–0.7 cm long; flowers numerous, subsessile; verticillasters loosely 8–9-flowered, distant, 2–2.5 cm long, 2–3 cm broad, in the axils of upper leaves; bracts 1.5 mm long, 0.4 mm broad, linear, acute, one-eighth to one-sixth the length of calyx, the margin ciliate; calyx campanulate, 0.9–1.3 (1.5) cm long, 2–3 mm broad, occasionally violet-tinged at base, with scattered hairs or almost villous, the teeth lanceolate, subulate-pointed, 0.5–0.8 cm long, 0.5–1 mm broad, slightly exceeding the tube, or 0.3 cm long and shorter than tube (var. *brachyodon* Bordz.), glabrous or pubescent, with ciliate margin, recurved or divaricate in fruit; corolla ochroleucous or dingy white, spotted at base of lower lip, (1.8) 2–2.5 cm long, densely pubescent outside especially in upper part, the tube 0.8–1.4 cm long, 2–2.5 cm broad, about 135 equaling or exceeding the calyx, attenuate and slightly curved at base, expanded at throat, with an oblique ring of hairs inside; upper lip obovate, 0.7–1 cm long, 0.6 cm broad, obtuse; lower lip 1–1.2 cm long, the middle lobe 4–6 mm long and 3–4 (5) mm broad, obreniform, attenuate at base, deeply emarginate at apex, the margin long-ciliate, the lateral lobes rounded, 2 mm long, each with one linear-subulate appendage 1 mm long; filaments glandular-hairy; anthers blackish-violet, hairy above; nutlets elongate-ovoid, subtrigonal, 3–3.5 mm long, 1.5–1.7 mm broad, dark gray, covered with whitish excrescences. April–August.

Deciduous, rarely coniferous forests, forest margins, coppices; as weed in orchards and truck gardens, at roadsides, near dwellings. — Arctic: Arc. Eur., Arc. Sib.; European part: Dv.-Pech., Balt., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., V.-Dns., Bes., Bl., Crim., L. Don.; Caucasus: Cisc., Dag., W., E. and S. Transc., Tal.; W. Siberia: Ob., U. Tob., Irt., Alt.; E. Siberia: Yenis., Ang.-Say., Dau.; Far East: Uss.; Centr. Asia: Balkh., Dzu.-Tarb., Mtn. Turkm., Syr D., Pam.-Al., T. Sh. Gen. distr.: Scand. (except N. part), Centr. and Atl. Eur., Med., Bal.-As. Min., Arm.-Kurd., Iran., Ind.-Him., Mong., Jap.-Ch., N. Am. (Canada). Described from Europe. Type in London.

Note. L.A. Kupriyanova (op. cit. 343) described the Central Asian *L. album* as a new species — *L. turkestanicum* Kupr. A survey of Central Asian plants and their morphological analysis have not disclosed any significant deviations from *L. album* and thus there appears to be no proper justification to confer a specific name upon the Central Asian plants.

**Economic importance.** Medicinal properties are attributed to the flowers (corollas only) which contain tannin, a glucoside, mucilage, sugar, an unidentified alcaloid, essential oil and saponin; the leaves have been found to contain 13.7–14.4 mg% carotin. Preparations from the flowers (water extract) are used in popular medicine (S.S. Stankov and N.V. Kovalevskii. *Nashi lekarstvennyye rasteniya i ikh vrachebnoe primeneniye*, 1945, 114; *Zemlinskii, Lekarstvennyye rasteniya SSSR*, 1949, 78). A good



honey plant, yielding a large amount of nectar and pollen. The yield of nectar in the Caucasus is 0.5 mg per flower. The leaves contain 137–147 gammas vitamin A (56.9 mg% in June and 285 mg% in July), 61 mg% vitamin C. Young leaves boiled in water resemble spinach (Grossg. Rast. res. Kavk. 37, 86, 219).

10. *L. dumeticola* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954). — *L. album* auct. Fl. URSS.

- 136 Perennial, (15) 30–80 cm high; stems ascending from base, simple, glabrous below, rather densely covered above with short retrorse hairs; leaves ovate or ovate-lanceolate, 2.5–12 cm long, 1–5 cm broad, on petiole to 6 cm long, shallowly cordate or shortly cuneate at base, mostly long-tapering to a sharp point, with crenate-serrate or dentate-serrate margin, covered on both sides with short appressed hairs; verticillasters 2–6, more or less distant; calyx tubular-campanulate, 1.1–1.4 cm long, the tube 5–6 mm long, the nerves covered outside in upper part with scattered short retrorse hairs, the teeth lance-subulate, 5–9 mm long, ciliate; corolla 2–2.3 cm long, ochroleucous, covered outside with rather short hairs; tube 1–1.2 cm long, distinctly longer than limb, 1–1.5 mm broad at base, abruptly expanded above the middle to 1.5–2.5 mm; upper lip villous-ciliate at margin, the middle lobe cut to the middle into 2 obtusely toothed segments, the lateral lobes arched, with linear-subulate often recurved appendage 2–2.5 mm long; nutlets to 3 mm long, 1.3 mm broad, tapering at base. May–September.

Steppe thickets, wood margins, dry meadows, rock crevices; sometimes as weed in orchards, more rarely in fields. In southern forest-steppe and steppe regions. — European part: M. Dnp., V.-Don., Bl., L. Don. Endemic. Described from Zhdanov in Stalino Province. Type in Leningrad.

Note. This species differs from *L. album* in the stem being glabrous below, covered above with short retrorse hairs; leaves covered with short hairs, the middle and upper cauline leaves often short-cuneate at base; corolla ochroleucous with tube not shorter than limb. M.V. Klovok notes that *L. dumeticola* Klok. is a steppe plant of scrub borders and represents a rather ancient autochthonic element of Pontic flora.

11. *L. barbatum* Sieb. et Zucc. Fl. Jap. Fam. Nat. II (1848) 511; Kom. Fl. Kamch. III, 59; Kom. and Alis. Opred. rast. Dal'nevost. kr. II, 904. — *L. album* var. *barbatum* Fr. et Sav. Enum. pl. Jap. I (1875) 380. — *L. maculatum* Maxim. Prim. Fl. Amur. (1859) 221, non L. — *L. petiolatum* Kom. Fl. Man'chzh. III (1907) 365, non Royle. — Ic.: Sugawara, Ill. Fl. of Saghal. IV, tab. 730.

- Perennial; rhizome with long underground shoots; stems to 1 m long, simple, erect, sparsely covered on the ribs with short appressed hairs; lower leaves ovate or cordate, 5–7 cm long, 3–4 cm broad, rounded or cuneate at base, acuminate, on petiole 3 cm long; upper leaves oval or oval-lanceolate, (5) 7–11 cm long, 2.5–5 cm broad, short-petioled, unevenly serrate-dentate; all leaves long-acuminate, sparsely covered with short white hairs; flowers sessile; verticillasters 4–14-flowered, in the axils of distant upper leaves; bracts narrowly linear or filiform, (2) 2.5–3 mm long,
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acute, ciliate; calyx campanulate, 1–2 cm long, 0.2 cm broad, about equaling the corolla tube, sparsely hairy, the tube 0.3 cm long, occasionally violet-tinged at base, the teeth lance-subulate, 7 mm long, elongate, ciliate; corolla pale pink, 2 cm long, pubescent or almost tomentose outside in upper part, the tube 1.2 cm long, narrow and more or less curved at base, expanded at throat, with an oblique ring of hairs inside; upper lip obovate or oblong, hooded, 0.8–1 cm long, 3.5–4.5 (5) mm broad, entire or sometimes emarginate, ciliate; lower lip villous, 5 (6.5) mm long, the middle lobe obreniform, deeply emarginate, 4.5 (6) mm long, 4.5 (6) mm broad, attenuate at base, the lateral lobes 0.5 mm long, with one subulate or filiform appendage; filaments pubescent; anthers blackish-violet, hairy at apex; nutlets obovoid, 3–3.5 mm long, 1.5–1.7 mm broad, trigonous, brownish, smooth or mostly with whitish tuberclelike excrescences. May–July.

Deciduous, cedar-broad-leaved and mixed forests, willow and bird cherry waterside woods, alder and hazelnut thickets, forest margins, grass and scrub slopes, seaside strips of sand and pebble. — Far East: Kamch., Ze.-Bu., Uda., Uss., Sakh. Gen. distr.: Japan and China. Described from Japan.

Series 3. *Maculata* Gorschk. — Perennials, more or less hairy; leaves with light-colored spots; corolla purple, the lower lip spotted.

12. *L. maculatum* L. Sp. pl. ed. 2 (1762) 809; M. B. Fl. taur.-cauc. III, 396; Ldb. Fl. Ross. III, 1, 430; Boiss. Fl. or. IV, 763; Shmal'g. Fl. II, 336; Grossg. Fl. Kavk. III, 305; Kryl. Fl. Zap. Sib. IX, 2353. — *L. vulgatum* Benth. Lab. Gen. et sp. (1832–1836) 514, p. p. — Ic.: Fedch. and Fler. Fl. Evrop. Ross. Fig. 729; Syreishch. Fl. Mosk. gub. III, 93. — Exs.: GRF, No. 635; Fl. Pol. exs. No. 65; Fl. exs. Austro-Hung. No. 2649; Fl. Lithuan. exs. No. 21–100; Fl. Boh. et Mor. exs. No. 889; Pl. Hercegov. exs. No. 294; Fl. Gall. et Germ. exs. No. 435; Fl. Ital. exs. No. 1944.

Perennial, with creeping rhizome 2–3 mm thick; stems 20–60 cm long, prostrate at base, often rooting, covered with scattered white hairs; leaves ovate, 2–6 (10) cm long and 1–5 (6.5) cm broad, rugose, acuminate, with crenate or doubly serrate margin, mostly sparsely hairy beneath, glabrous above, with light-colored speckles; lower  
138 leaves broadly cordate at base, on petiole 1.5–5.5 cm long; upper leaves subtruncate at base, 1.5–4.5 cm long, 0.7–2 cm broad, exceeding the flowers, sessile or on petiole 0.5–1 cm long, sometimes reddish-tinged; flowers numerous, sessile; verticillasters 6–10-flowered, in the axils of upper leaves; bracts 1.5–2.5 mm long, 0.2 mm broad, linear, one-fifth to one-fourth the length of calyx, ciliate; calyx campanulate, 1–1.3 cm long, 2 mm broad, obliquely truncate in upper part, the base and teeth sometimes suffused with violet; teeth lanceolate, long-acuminate with a fine subulate point, 5–6 mm long, as long as or longer than the tube, the upper longer than the lower, all strongly recurved, divaricately spreading; corolla rose-purple or pinkish, with spotted lower lip or with finer lower lip without spots (var. *immaculatum* Syr.), 1–8–2.5 [?] cm long, densely pubescent outside especially in upper part, with slender curved tube (0.7) 1–1.5 cm long, 0.3–0.4 cm broad, compressed at base, enlarged at

throat, with a transverse ring of hairs inside; upper lip oblong, 1 cm long, attenuate at base, straight, entire, short-ciliate, slightly curved above; middle lobe of lower lip obreniform, attenuate at base, cleft nearly to the middle, unevenly and obtusely crenate, the lateral lobes triangular, each with one subulate curved appendage 1–1.5 mm long; filaments pubescent; anthers hairy; nutlets obovoid-trigonus, brown, 2.5–3 mm long, 1.5 mm broad. May–August.

Wet sandy banks of rivers and streams, gullies, treeless mountain slopes, felling areas, deciduous and mixed forests and wooded gullies. — European part: Dv.-Pech., Balt., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don., Transv., U. Dns., Bes., Bl., Crim., L. Don.; Caucasus: Cisc., Dag. W. and E. Transc., Tal. **Gen. distr.:** Centr. Eur., Med., Iran. (N.), N. Am. (Canada). Described from Europe. Type in London.

**Economic importance.** Young leaves are used for food (in soups and borshch). A good honey plant (according to Grossheim).

### Genus 1270.\* *Galeobdolon*\*\* Adans.

Adans. Fam. II (1763) 190. — Section *Galeobdolon* Benth. Lab. Gen. et sp. (1832–1836) 515. — Subgenus *Galeobdolon* (Moench) Aschers. in Aschers. et Graebn. Fl. des Nordostdeutsch. Flachl. (1898–1899) 600

Flowers sessile; verticillasters 6-flowered, in the axils of upper leaves, the upper approximate; bracts one-third to one-half the length of calyx; calyx campanulate, obscurely 10-nerved, pubescent, with lance-subulate teeth; corolla yellow, the tube almost curved, gradually expanding at throat, inflated, with an oblique ring of hairs inside, not exerted; upper lip ovate-oblong, galeate, entire; lower lip 3-lobed, with lanceolate entire acute lobes, the middle lobe slightly larger, the lateral lobes unappendaged; stamens 4, exerted from calyx tube, the lateral longer than the median; anthers glabrous, with divergent cells; style with 2-lobed stigma; nutlets obovoid. Herbaceous perennials with cordate long-petioled lower leaves.

The genus consists of one species distributed in W. Europe and N. Iran.

1. *G. luteum* Huds. Fl. Angl. ed. 2, 1 (1798) 258; Grossg. Fl. Kavk. III, 305; Maevsk. Fl. ed. 7, 618. — *G. galeopsis* Curt. Fl. Lond. II (1798) tab. 223. — *G. vulgare* Pers. Syn. pl. II (1807) 122. — *Leonurus galeobdolon* Scop. Fl. carn. (1760) No. 705. — *Lamium galeobdolon* (L.) Crantz, Stirp. Austr. ed. II (1769) 262; Ldb. Fl. Ross. III, 1, 431; Boiss. Fl. or. IV, 756; Shmal'g. Fl. II, 335. — *Galeopsis galeobdolon* L. Sp. pl. (1753) 580. — *Pollichia vulgare* Pers. in Ust. Annal. XIV (1795) 39. —  **Ic.:** Fedch. and Fler. Fl. Evrop. Ross. 817; Syreishch. Fl. Mosk. gub. III, 95. —  **Exs.:** Fl. exs. Austro-Hung. No. 3295; Pl. Finl. exs. No. 1298; Fl. Boh. et Mor. exs. No. 1081 et No. 885; H. Fl. Reip. Sov. Ucr. No. 86; GRF, No. 1625; Herb. Fl. Ingr. No. 503.

\* Treatment by S.G. Gorshkova.

\*\* From Greek *gale*, weasel, skunk, and *bdolos*, stench, referring to the unpleasant odor of the plant.



Perennial, with a stringlike branching rhizome, 30–60 cm high, hairy; stems covered with soft appressed white hairs; flowering shoots simple, erect; sterile shoots trailing, rooting; leaves ovate or oblong-ovate, the lower 1–3 (5) cm long, 1–3.5 cm broad, with petiole 1–3.5 cm long, the upper 1–3 (4) cm long, 1–2 (3) cm broad, lanceolate, on shorter petiole, exceeding the flowers; all leaves acute, rugose, dentate with uneven sharp teeth or serrate-crenate, subglabrous above, sparsely covered beneath with appressed white hairs; verticillasters 6-flowered, the upper crowded, the lower subdistant; bracts 4–4.5 mm long, linear-lanceolate, subulate, acute, one-third to half the length of calyx, with ciliate margin; calyx campanulate, (0.8) 1–1.4 mm long, 2–2.5 mm broad, densely short-pubescent or more sparsely puberulent (f. *puberulum* Beck.), about half the length of corolla, the tube 5–7 mm long, the teeth triangular-lanceolate or lance-subulate, acute, 5–7 mm long, about as long as the tube; corolla yellow with orange-spotted lower lip, (1.6) 2–2.5 cm long, pubescent outside, with ciliate margin, the tube slender, 1–1.3 cm long, 1.5 mm broad, not exerted, compressed at base, inflated above, expanded at throat, with a ring of hairs inside; upper lip oblong-ovate, 1–1.3 cm long, obtuse, entire, attenuate at base, nearly as long as corolla tube; lower lip larger, 4–4.5 cm long, 1.5 mm broad, the lateral lobes of similar shape, 3–3.5 mm long, 1 mm broad, triangular or ovate-lanceolate, acute; filaments pubescent; anthers glabrous; nutlets obovoid, 3–3.5 mm long, 1.5–1.8 mm broad, black or brownish, trigonous. May–July.

Deciduous (rarely coniferous) woods, coppices and meadows. — European part: Dv.-Pech., Balt., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don., Transv. (Burguslan), U. Dns., Bes., Bl., L. V. (Krasnoarmeisk); Caucasus: W. and E. Transc., Tal. Gen. distr.: Scand., Centr. Eur., Atl. Eur., Med., Iran. (N.). Described from Europe. Type in London.

### Genus 1271.\* *Erianthera*\*\* Benth.

Benth. in Hook. Bot. Misc. III (1833) 380

Flowers hermaphrodite, few, sessile; bracts shorter than calyx, subulate; calyx tubular-campanulate, almost regular, with 5 linear-lanceolate teeth, lanate; corolla purple, the tube large, exerted, straight, glabrous inside, moderately expanded at throat, with bilabiate limb; upper lip subgaleate, emarginate; lower lip divergent, 3-lobed, the middle lobe very large, bifid, the lateral lobes ovate or oblong, emarginate, without pleuridia, larger than in species of *Lamium*; stamens 4, ascending, didynamous, the lower exerted; anthers approximate in pairs, lanate or (in our species) glabrous, with 2 spreading cells; style equally 2-lobed at apex, the lobes subulate, with apical stigmas. Mostly low plants of high mountains; cauline leaves approximate, simple, petiolate; floral leaves subsessile; all green parts villous- or velutinous-tomentose, resembling in habit the Himalayan genus *Eriophyton* Benth.

Two species.

\* Treatment by S.V. Yuzepchuk.

\*\* From Greek *erion*, wool, and *anther*.

1. *E. anomala* Juz. in Bot. mat. gerb. Bot. inst. AN SSSR, XV (1953) 267. — *Lamium anomalum* Juz. op. cit. — *L. rhomboideum* Rupr. in Osten-Sacken et Rupr. Sert. tianschan. in Mem. Acad. Sc. Petersb. VII ser. XIV, 4 (1869) 67; O. and 141 B. Fedch. Perech. rast. Turk. V, 167 et auct. omnium Fl. As. Med. non Benth. — Ic.: Yuzepchuk, op. cit. 271.

Perennial; root long and stout, vertical, sparingly branched; stems numerous, 12–35 cm long, usually simple in underground part, slender, strongly flexuous, pale, glabrous, covered with ovate-lanceolate glabrous scales (these gradually larger upwards), in upper part simple or more often branching from base, suberect, stoutish, hollow, purple-tinged, very densely and softly white- or yellowish-villous; lower leaves small, spatulate, entire, rather long-petioled, distant; upper leaves larger, ovate-rhombic, cuneate at base; floral leaves closely (almost rosulately) approximate, with dilated petiole short or subsessile, broadly rhombic or cuneately flabelliform, obtuse-angled or almost rounded at apex, obscurely and sparingly crenate or subentire, the largest 1.5–4 cm long and broad; all leaves canescent on both sides with dense whitish velutinous-tomentose indument, distinctly netted-veined, the veins darker and less densely hairy; verticillasters 2- or 4-flowered; bracts ca. 7 mm long, equaling the calyx tube, softly tomentose; calyx 1.5–2 cm long, ca. 8 mm broad, campanulate, densely villous-tomentose with soft subappressed hairs, weakly accrescent in fruit; calyx teeth ca. 7 mm long, two-fifths the length of the tube, soft-lanate nearly to apex or more often terminating in a short glabrous spine; corolla large, 3–4 cm long, nearly twice the length of calyx, purple, soft-haired outside, almost woolly; corolla tube ca. 1.5–2 cm long, ca. 3–4 mm broad about the middle; upper lip (galea) ca. 1.5 cm long, broad, oblong-ovate, obtuse, entire or scarcely emarginate; lower lip slightly longer, the lateral lobes ovate or oblong, emarginate, ca. 4 mm long and as broad, the middle lobe larger, 8–10 mm long and ca. 6 mm broad; anthers glabrous or nearly so; nutlets unknown. July–August.

Stony slopes and screes in the alpine mountain belt. — Centr. Asia: T. Sh., Pam.-Al. Endemic? Described from Alai range, Saryk-Mogol river valley. Type in Lenin-grad.

Note. As evident from the synonymy, this Central Asian plant was accepted as the Himalayan *E. rhomboidea* Benth. (*Lamium rhomboideum* Benth.). It differs from that species in the poor development of leaf teeth, shorter bracts and, above all, the glabrous or subglabrous anthers. In view of the latter character, the generic name *Erianthera* can hardly be considered as appropriate.

## 142 Genus 1272.\* *Wiedemannia*\*\* Fisch. et Mey.

Fisch. et Mey. Ind. sem. hort. Petrop. IV (1837) 51

Flowers numerous, sessile; verticillasters dense, globular, the upper approximate; bracts herbaceous, rather hard, persistent, shorter than calyx, subreticulate, entire,

\* Treatment by S.G. Gorshkova.

\*\* Named for Eduard Wiedemann who traveled extensively in Anatolia and Bithynia and collected a large number of plants.

mucronate; calyx obconical or subcampanulate, reticulate, 10-nerved, bilabiate, the upper lip lanceolate, entire, straight, point-tipped, slightly shorter than the lower lip, this 4-fid, plicate with point-tipped hard unequal segments, the lateral of these slightly shorter, enlarged at base, straight or convergent; corolla purple, open, exserted, 2-lipped, the tube straight, with an oblique ring of hairs inside above the base, the throat campanulate or truncate, not gibbous; upper lip obovate-oblong or subfalcate-oblong, arched-hooded, attenuate at base, truncate-emarginate at apex, covered outside with long, multicellular violet hairs, densely lanate; lower lip 3-parted, the middle lobe obcordate or obreniform, narrowing at base, plicate, deflexed 2-parted, the lateral lobes very short, rounded, truncate, each with a small toothed appendage; stamens 4, exserted, parallel, the filaments white-villous; anthers approximate, finally spreading, white-hispid; style as long as stamens, curved at apex, with 2-parted stigma, the lobes short, subulate, equal; nutlets dry, small, obovoid-oblong, obtuse, sharply trigonous, truncate at apex, dark brown to nearly black, covered with irregular whitish tubercle-like accrescences. Annual plants, resembling *Lamium*, more or less hairy, glandular-punctate; leaves dull, rugose, varying in shape, the lower petiolate, with rounded teeth, the upper incised-lobate; floral leaves palmately 3–5-parted or palmatifid, subsessile or short-petioled.

The genus consists of 3 species distributed in Asia Minor, of these one penetrates into S. Transcaucasia.

1. *W. multifida* (L.) Benth. in DC. Prodr. XII (1848) 503; Boiss. Fl. or. IV, 767; Grossg. Fl. Kavk. III, 279. — *Lamium multifidum* L. Sp. pl. (1753) 579. — Ic.: Jaub. et Spach, Illustr. pl. or. III, tab. 272; Post, Fl. Syr. Pal. Sin. 651. — Exs.: Herb. Fl. Cauc. No. 187.

- 143 Annual; stems green or ferruginous, erect, simple, sometimes branching, 25–45 cm long, covered with short appressed white hairs; leaves more or less rugose, obtuse, glabrous, more or less pubescent beneath, varying in shape, the lower oblong or ovate, 1.5–3 cm long, 0.5–1 cm broad, entire or round-toothed, with petiole 0.5–1.7 cm long; upper leaves incised-lobate; floral leaves sinuate-pinnatifid or mostly 3–5-palmatifid, 1–2 cm long, 0.5–1 cm broad, subsessile or on petiole 3–4 mm long, the segments lanceolate to subrhomboid, incised-dentate or crenate; flowers sessile; verticillasters dense, with 6–8 (10) or more flowers, distant, the upper approximate; bracts cuneate, 4.5 mm long, 2 mm broad, about half the length of calyx, truncate or truncate-emarginate, aristate, appressed, concave, pubescent; calyx 1 cm long, accrescent in fruit and then 1.3–1.4 cm long, indurated, more or less pubescent outside, short-haired inside, the tube 7 mm long, 2 mm broad; upper lip subovate or lanceolate, 3 mm long, 1 mm broad, interruptedly point-tipped; lower lip 4–4.5 (5) mm long, 4 mm broad, subdeltoid in outline, 4-fid, the segments triangular-lanceolate, the median 3 mm long, the outer 2 mm long, enlarged at base, aristate-subulate, straight or convergent, 1-nerved; corolla dingy-purple, 2.3–2.5 cm long, about twice the length of calyx,



2-lipped, open, more or less pubescent outside, with an oblique ring of hairs inside above the base, about as long as calyx, the throat campanulate, inflated, hairy-tomentose; upper lip subfalcate-oblong, 0.9 cm long, 0.4 cm broad, hooded, attenuate at base, truncate-emarginate at apex, densely lanate outside, violet-haired; lower lip 5–6 mm long, 3-parted, the lateral lobes short, rounded, truncate, 1–1.5 mm long, each with a small appendage 1 mm long; middle lobe obcordate or obreniform, 6–7 mm long, 0.6–0.9 cm broad, attenuate at base, plicate, more or less recurved; stamens exserted, the filaments loosely pubescent; anthers black, covered with long stiff white hairs; style as long as stamens, with 2-parted short stigma, the lobes subulate, equal; nutlets obovoid-oblong, 2 mm long, 1 mm broad, sharply trigonous, dark brown to nearly black, truncate at apex, covered with dingy-white irregular tuberclelike excrescences. May–June.

Dry steppes, often in cultivated field. — Caucasus: S. Transc. **Gen. distr.:** Arm.-Kurd. Described from Armenia. Type in London.

Note. *W. multifida* has been erroneously reported for European Russia by Pallas, Georgi, Ledebour and others. As shown by E.G. Bobrov (Izv. Bot. sada, XXVII, 174), these reports refer to *Lamium amplexicaule* s.l. Another plant confounded with  
 144 the latter was *L. amplexicaule orientale*, mentioned in 1892 by I. Pachovskii and later renamed by Voroshilov *L. paczoskianum* Vorosch., with almost palmatipartite upper leaves, with incisions between the lobes. *W. multifida* is distinguishable from *L. paczoskianum* by the clearly bilabiate 10-nerved calyx, the upper lip lanceolate-subovate, interruptedly point-tipped, the lower lip 4-fid, with triangular-lanceolate sharply subulate segments.

### Genus 1273.\* *Chaiturus*\*\* Willd.

Willd. Prodr. Fl. Berol. (1787) 200. — Generis *Leonurus* sect. *Chaiturus* DC. in Lam. et DC. Fl. Franc. III (1805) 554

Verticillasters many-flowered, forming a long inflorescence; calyx tubular-campulate, 10-nerved; calyx teeth 5, upright, equal, subulate-pointed; corolla whitish-pink, not exceeding the calyx, without a ring of hairs in tube, the lips subequal; lower lip 3-lobed, with obovate lobes, the middle lobe slightly exceeding the lateral lobes; upper lip ovate, pubescent above; stamens equal, the cells divergent; nutlets sharply trigonous, rounded at apex. Annuals or biennials.

1. *Ch. marrubiastrum* (L.) Spenn. in Nees, Gen. Fl. Germ. II, tab. 31 (1843); Moench, Meth. pl. 402; Shmal'g. Fl. II, 334; Grossg. Fl. Kavk. III, 306. — *Ch. leonuroides*

\* Treatment by L.A. Kupryanova.

\*\* From Greek chaite, mane, and ura, tail.

Willd. Prodr. Fl. Berol. (1787) 201. — *Leonurus marrubiastrum* L. Sp. pl. (1753) 584; Ehrhardt in Hanow. Magazin (1781) 421, No. 21. Ldb. Fl. Ross. III, 424; Benth. Lab. Gen. et sp. 520; Kryl. Fl. Zap. Sib. IX, 2359. — *Cardiaca marrubiastrum* Medic. Beobacht. (1783) 127. — Ic.: Fedch. and Fler. Fl. Evrop. Ross. III, Fig. 733. — Exs.: GRF, No. 479.

Biennial, grayish-green; stems erect, 30–60 cm long, branching in upper part, covered on ribs and faces with short appressed retrorse hairs; leaves 2–5 cm long, 2–3 cm broad, glabrous above, covered beneath with short appressed soft hairs, petiolate, simple, ovate, coarsely serrate-dentate, the lower rounded at base; floral leaves lanceolate, sparingly denticulate or entire, cuneate at base; inflorescence long; verticillasters numerous, distant; bracts acerose, as long as or very slightly shorter than calyx; calyx 7 mm long, tubular-campanulate, with short appressed hairs; teeth triangular at base, 145 finely subulate-pointed, half the length of the tube; corolla light pink, scarcely exserted, 6–7 mm long; nutlets 2–2.5 mm long, sharply trigonous, rounded at apex, with very short hairs. July–August.

In steppe areas, wastelands, river banks, roadsides. — European part: V.-Kama., U. Dnp., M. Dnp., V.-Don., Transv., U. Dns., Bes., Bl., Crim., L. V.; Caucasus: Cis., Dag., W. and E. Transc.; W. Siberia: Irt. (N.E. part), Ob. (S.E. part); Centr. Asia: Ar.-Casp., Balkh. (N.E. part), Dzu.-Tarb., T. Sh. (Alma Ata area). **Gen. distr.:** Centr. and Atl. Eur., N. Am. (introduced), Dzu.-Kash. (Kuldja, introduced). Described from W. Europe. Type in London.

#### Genus 1274.\* *Leonurus*\*\* L.

L. Gen. pl. (1754) 254. — *Cardiaca* Lam. Fl. Franc. II (1778) 382; Moench, Meth. pl. (1794) 401

Verticillasters many-flowered, forming a long spikelike inflorescence; calyx conical, obscurely bilabiate, 5-nerved; calyx teeth 5, the lower reflexed, the upper upright; corolla 8–12 or 25 mm long, light pink or pinkish-violet; upper lip obovate or oval, pubescent above; lower lip slender, scarious, spreading, speckled with purple, 3-lobed, the lateral lobes short, ovate, the middle lobe oblong-ovate; corolla tube inflated above an oblique ring of hairs; upper stamens half the length of the lower, parallel under the upper lip, the lower at length recurved; style 2-lobed; nutlets sharply trigonous, truncate.

Note. The genus *Leonurus* is conceived in our treatment more narrowly than in the treatment of some of our predecessors who included it in the genera *Panzeria* and *Chaiturus* as sections.

The genus *Leonurus* L. s. str. is composed of 14 species, of which 11 are distributed in the Soviet Union. The species growing outside Soviet territory are *L. persicus* Boiss. in northern Iran, *L. royleanus* Benth. and *L. pubescens* Benth. in India.

\* Treatment by L.A. Kupryanova.

\*\* From Greek *leon*, lion, and *ura*, tail.

**Economic importance.** Species of *Leonurus* are used medicinally for treatment of neuro-cardiac ailments. They lower blood pressure and they alleviate cardiovascular neuroses and myocardiac disorders. In its effect on the nervous system, motherwort is 3–4 times as potent as valerian. (According to some sources the effect is confined to the central nervous system.)

146 Preparation of the medicinal material from motherwort is much simpler as compared with valerian. Some of the motherwort species are very common; they grow in profusion in ruderal habitats, at roadsides and near habitations. Aerial parts are used and this greatly facilitates gathering. The herbage contains alcaloids, 5–9% tannin and 0.03% essential oil. Species of *Leonurus* are also useful as honey plants. The medicinal and other applications of motherwort are discussed in detail by B.M. Kozo-Polyanskii in a paper entitled “Pustymik – novoe lekarstvennoe i tekhnicheskoe rastenie Voronezhskoi oblasti” (Motherwort – a new medicinal and technical plant of the Voronezh area), Izd. Voronezhsk. obl. doma sanitarnogo prosveshcheniya, 1945.

1. Corolla 8–12 mm long, the tube inflated above the oblique ring of hairs; lower lip slender, spreading, ovate, the middle lobe ovate; upper stamens half the length of the lower; plants covered with soft appressed or patent hairs or glabrous . . . . . 2.
- + Corolla (9) 12–28 mm long, the tube straight, not enlarged above the straight ring of hairs; lower lip straight, the middle lobe cordate; stamens subequal; plants covered with soft appressed or rough stiff hairs . . . . . 10.
2. All plant parts glabrous; stems, petioles and calyx reddish-violet; leaves palmatisect to base, the segments narrow, linear, incised in turn; upper lip of corolla completely glabrous . . . . . 7. *L. mongolicus* V. Krecz. et Kuprian.
- + All plant parts or only the faces and ribs of stems, petioles, leaf blades and calyx covered with appressed or patent hairs . . . . . 3.
3. Bracts rigid, subulate; inflorescence long, with distant whorls; leaves 5–8 cm in diameter . . . . . 5.
- + Bracts soft, filiform; inflorescence contracted, short, lanate or tomentose; leaves 2–4 cm in diameter . . . . . 4.
4. Gray plants, softly tomentose; bracts shorter than calyx . . . . . 9. *L. incanus* V. Krecz. et Kuprian.
- + Green plants; leaves and stems covered with barely visible appressed hairs and short glands; inflorescence lanate; bracts equaling or exceeding the calyx . . . . . 8. *L. panzerioides* M. Pop.
5. Plants with long patent hairs on stem faces and ribs, petioles, blades and calyx, or plants with patent hairs on upper part of stem and on calyx . . . . . 6.
- 147 + Plants with short appressed hairs on stem faces and ribs, petioles, leaf blades and calyx . . . . . 7.
6. Plants hairy only in upper part of stem and in inflorescence; lower cauline leaves glabrous, dissected nearly to base into narrow segments, these cut in turn into linear lobes . . . . . 6. *L. tauricus* L.
- + All leaves covered with long patent hairs; lower cauline leaves dissected to two-thirds or to the middle into broad oblong-rhomboid large-toothed segments . . . . . 2. *L. quinquelobatus* Gilib.



7. Lower cauline leaves cut to the middle into broad oblong segments, these unevenly large-toothed; upper leaves oval, rounded at base, the margin with 2 larger lateral teeth; calyx glabrous . . . . . 1. *L. cardiaca* L.
- + Lower cauline leaves dissected to two-thirds or more into cuneate or narrowly cuneate segments; leaves in inflorescence oblong-rhomboid, trisected into narrow lanceolate or linear segments; calyx covered with short appressed hairs . . . . . 8.
8. Plants 70–200 cm high, dense foliage; leaves dissected to two-thirds into broad cuneate lobes, these cut in turn into broadly lanceolate segments; calyx distinctly bilobate, the lower 2 teeth strongly accrescent . . . . . 4. *L. turkestanicus* V. Krecz. et Kuprian.
- + Plants 30–100 cm high, sparse foliage; lower leaves soon deciduous, thus stems naked in lower part at onset of flowering; leaves dissected nearly to base into narrow cuneate segments, these cut in turn into lanceolate lobes . . . . . 9.
9. Plants 30–70 cm high; leaves 3–5 (7) cm in diameter; inflorescence 4–10 cm long; upper lip of corolla slightly pubescent . . . . . 5. *L. deminutus* V. Krecz.
- + Plants 50–100 cm high; leaves 5–10 cm long and broad; inflorescence 15–30 cm long; upper lip of corolla with dense white hairs . . . . . 3. *L. glaucescens* Bge.
10. Perennial plants; leaves 3-lobed; corolla 25–28 mm long . . . . . 10. *L. macranthus* Maxim.
- + Annual or biennial plants; leaves dissected to base into 3 narrow segments, these pinnatifid with linear segments; corolla 9–20 mm long . . . . . 11.
11. Upper leaves in inflorescence simple, linear-lanceolate; corolla 9–10 mm long, the lower lip equaling the upper . . . . . 11. *L. heterophyllus* Sweet.
- + Upper leaves in inflorescence trisected, with linear segments; corolla 18–20 mm long, the lower lip two-thirds the length of the upper . . . . . 12. *L. sibiricus* L.

148 Subgenus 1. **Cardiaca** Benth. Lab. Gen. et sp. (1832–1836) 518. — Calyx distinctly bilabiate, the 2 lower teeth spreading; corolla tube inflated above an oblique ring of hairs; lower lip spreading, 3-lobed, all the three lobes oblong-ovate; upper lip obovate, attenuate toward base, slightly concave; leaves 5-fid.

Series 1. *Cardiaci* V. Krecz. et Kuprian. — Leaves dissected to the middle or to two-thirds into oblong cuneate broad segments, these unevenly large-toothed; calyx conical, glabrous or hairy.

1. *L. cardiaca* L. Sp. pl. (1753) 584; Szafer, Kulcz., Pawlow. Rosl. Polsk. (1924) 543 (var. *villosus* excl.); Vozn. rosl. URSR, 417. — *Cardiaca trilobata* Lam. Fl. Franc. II (1778) 383; Gilib. Fl. Lithuan. 84. — *Cardiaca vulgaris* Moench, Meth. pl. (1794) 401. — Ic.: Rchb. Ic. fl. Germ. (1856) MCCXIII (II); Hegi, Ill. Fl. V, 4, Fig. 2392, 3265. — Exs.: Fl. exs. Reip. Boh.-Slov. No. 357.

Perennial, glabrous, with woody rhizome; stems 50–200 cm long, branched, with short crisp hairs on the ribs; leaves glabrous; cauline leaves on petiole 7–12 cm long, ovate or broad-ovate in outline, the lowest 5-partite, the middle usually 3-fid, with broad oblong toothed segments; leaves in inflorescence elliptical, ovate at base, with 2 large lateral teeth, the petiole 1.5–2 cm long; inflorescence long, with distant whorls; bracts subulate, short-haired; calyx glabrous, 5–6 mm long, the teeth subulate, triangular at base, 3–3.5 mm long, the 2 lower teeth recurved; corolla pink, 9–9.5 mm long; upper lip white-haired outside, sometimes glabrous; nutlets 2.5–3 mm long. June–September.

Ruderal habitats. — European part: Balt., U. Dnp., Bl. (Odessa), L. V. (Krasnoarmeisk). **Gen. distr.:** Scand., Atl. and Centr. Eur., Bal.-As. Min. Described from Europe. Type in London.

2. *L. quinquelobatus* Gilib. in Usteri, Delect. op. bot. II (1793) 321. — *Cardiaca quinquelobata* Gilib. Fl. lithuan. (1781) 85. — *L. villosus* Desf. Tab. ed. II (1815) 73, nom.; Dum. d'Urv. Enum. pl. (1822) 69, descript.; Maevskii, Fl. (1940) 619. — *L. cardiaca*  $\beta$ . *villosus* Ldb. Fl. Ross. III (1847–1849) 423; Boiss. Fl. or. I, 753; 151 Grossg. Fl. Kavk. III, 307. — *L. canescens* Dum. Fl. Belg. (1827) 46. — **lc.:** Syreishch. Fl. Mosk. gub. I, 107; Rchb. Ic. fl. Germ. tab. 1222. — **Exs.:** GRF, No. 1491; Fl. Pol. exs. No. 769.

Perennial, grayish with long spreading soft hairs; rhizome woody; stems 50–200 cm long, erect, branching, reddish, covered all over with long spreading hairs, sharp-ribbed; leaves bright green above, pale beneath, covered on both sides with scattered fine appressed hairs, patent-haired beneath on the prominent veins; cauline leaves on petiole 2–7 (12) cm long, rounded in outline, cordate or truncate at base, dissected to two-thirds into 5 oblong-cuneate unevenly large-toothed segments; leaves in inflorescence on petiole 1.5–2 cm long, oblong-rhomboid, cuneate at base, 2-parted or 2-toothed; inflorescence long, with distant whorls; bracts subulate, patent haired; calyx 8 mm long, the teeth subulate, triangular at base, 2.5–3 mm long, the two lower ones spreading; corolla pink or pinkish-violet, 12 mm long, the upper lip white-haired outside; nutlets 2.5–3 mm long. June–July. (Plate VIII, Figure 2.)

Weedy places near dwellings, in groups. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., Balt., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bes., Bl., L. Don, Crim.; W. Siberia: Ob., U. Tob., Irt.; Caucasus: Cisc., Dag., W. and E. Transc. **Gen. distr.:** Scand. (in E. part, rarely), Centr. Eur. Described from E. Europe. Type in Paris.

**Note.** The synonyms listed by Ledebour (Fl. Ross.) for *L. cardiaca*  $\beta$ . *villosus*: *L. neglectus* Schrank, *L. lacerus* Lindl. and *L. condensatus* Hornem. are not acceptable in our view as synonyms of *L. quinquelobatus* Gilib., as they cannot be confidently referred either to *L. quinquelobatus* Gilib. or to *L. cardiaca* L. The species *L. condensatus* from Ledebours herbarium is none other than *L. heterophyllus* Sweet. Another form, *L. cardiaca*  $\gamma$ . *crispus* Murr. (*L. crispus* Murr.), reported by Ledebour for Siberia and also preserved in his herbarium, is represented by deformed garden-grown samples, with damaged stems and crisped leaves; they



PLATE VIII. 1 – *Leonurus turkestanicus* V. Krecz. et Kuprian., upper part of stem, leaf; 2 – *L. quinquelobatus* Gilib., part of stem, flower; 3 – *L. glaucescens* Bge., upper part of stem, leaf.



should probably be referred to *L. cardiaca* L.; we have not encountered any samples with such leaves among wild Siberian plants.

Series 2. *Glaucescentes* V. Krecz. et Kuprian. — Plants glaucescent with short appressed hairs; leaves dissected nearly to base or to two-thirds into narrow cuneate or rhomboid segments, these pinnatipartite with lanceolate or linear lobes; calyx gibbous, covered with short appressed hairs.

3. *L. glaucescens* Bge. in Ldb. Fl. alt. II (1830) 409; Ldb. Fl. Ross. III, 423; Grossg. Fl. Kavk. III, 307; Maevskii, Fl. 619. — *L. campestris* Andr. ex Bess. pl. 152 exs. (nomen). — *L. cardiaca*  $\beta$ . *glaucescens* Schmalh. Fl. Ross. II (1896) 476. — ? *Cardiaca glabra* Gilib. Fl. lithuan. (1781) 85. — Ic.: Ldb. Ic. pl. Fl. Ross. II (1830) tab. 179).

Perennial or biennial, glaucescent all over with very short appressed hairs; stems several, rarely solitary, 50–100 cm long, branching, with prominent scabrous ribs in upper part; leaves orbicular in outline, dissected nearly to the straight base into 5 narrow cuneate segments, these pinnatifid with linear or linear-lanceolate lobes; lower leaves shed at onset of flowering; leaves in inflorescence rhomboid in outline, cuneate at base, dissected into 3 linear entire segments; inflorescence long, with distant whorls; bracts subulate, with short appressed hairs; calyx 7–8 (9) mm long, narrowly conical, slightly gibbous, with short appressed hairs, the teeth 3–3.5 mm long, triangular at base, abruptly terminating in a subulate point longer than the base, the lower two spreading and connate higher up; corolla light pink, 10–12 mm long, the upper lip covered with long white hairs; nutlets 2–3 mm long. June–August. (Plate VIII, Figure 3.)

Scrub, gullies and steppes, rarely a weed. — European part: V.-Kama, Transv., Bes., Bl., L. Don, L. V.; W. Siberia: Ob., U. Tob., Irt., Alt.; Centr. Asia: Ar.-Casp., Balkh.; Caucasus: E. and S. Transc. Gen. distr.: W. Mong. Described from Altai. Type in Leningrad.

4. *L. turkestanicus* V. Krecz. et Kuprian in Bot. mat. gerb. Bot. inst. Akad. Nauk SSSR, XI (1949) 134.

Perennial, glabrous, with woody rhizome; stems numerous, more rarely solitary, branching, 70–200 cm long, with glabrous faces; leaves glabrous (only the floral with appressed gray hairs), on petiole not exceeding half the leaf length, orbicular or ovate in outline, with square or subcordate base, 6–10 cm long and 4–6 cm broad, dissected to two-thirds into rather broad cuneate segments, these cut in turn into broadly lanceolate lobes; leaves in inflorescence oblong-rhomboid, with cuneate base, 2-fid, with lanceolate lobes; inflorescence long, loose; bracts subulate, with fine appressed hairs; calyx 7–9 mm long, gibbous, covered with short appressed hairs, the teeth subulate-pointed, triangular at base, 4 mm long, the two lower spreading, 5–6 mm long, connate higher up; corolla pale pink, 9–10 mm long; upper lip white-tomentose; nutlets 2–2.5 mm long. May–June. (Plate VIII, Figure 1.)

Forest zone in mountains. — Centr. Asia: Dzu.-Tarb., Mtn. Turkm., Syr D., T. Sh., Pam.-Al. Described from Fergana. Type in Leningrad.

- 153 5. *L. deminutus* V. Krecz. in Bot. mat. gerb. Bot. inst. AN SSSR, XI (1949) 136.

Perennial or biennial, grayish with short appressed hairs; rhizome woody; stems 30–70 cm long, erect or somewhat ascending, simple, rarely branching, reddish-tinged at base, the faces covered with very short soft hairs; leaves glabrous, the lower cauline on petiole about half the length of blade, broad-ovate, subcordate at base, 4–5 (7) cm long and broad, dissected into 5 rhomboid segments, these pinnatifid with lanceolate lobes; leaves in inflorescence on petiole 2–3 cm long, dissected into linear-lanceolate lobes; inflorescence relatively short, with approximate whorls; bracts subulate, appressed-hairy; calyx 5–6 mm long, broadly conical, reddish or dark green, covered with short appressed hairs; calyx teeth 2–2.5 mm long, broadly triangular at base, gradually tapering to a subulate point, the lower two spreading; corolla pale violet, 8 (10) mm long, the upper lip with rather sparse white hairs. June–July.

Meadows, river banks, woods; also a weed. — E. Siberia: Ang.-Say., Lena.-Kol., Dau. **Gen. distr.:** Mong. Described from the vicinity of Verkhneudinsk. Type in Leningrad.

Series 3. *Tatarici* V. Krecz. et Kuprian. — Leaves incised nearly to base into narrow rhombic segments, these cut in turn into linear lobes; calyx conical, glabrous or long-haired.

6. *L. tataricus* L. Sp. pl. (1753) 584; Benth. Lab. Gen. et sp. 519; Ldb. Fl. Ross. III, 424; Kryl. Fl. Zap. Sib. IX, 2354. — *L. tataricus*  $\alpha$ . typicus Kryl. Fl. Alt. IV (1907) 1060. — *L. altaicus* Spr. Syst. veg. II (1825) 738; Ldb. Fl. alt. II (1830) 410.

Perennial or biennial, with woody rhizome; stems numerous, rarely solitary, 50–100 cm long, branching in upper part, glabrous in lower part, with long white hairs in inflorescence; leaves glabrous, the lower on petiole equaling the blade, rounded in outline, with straight or subcordate base, dissected to base into narrow oblong-rhombic segments, these dissected into lance-linear or linear lobes; inflorescence long, the lower whorls distant, the upper approximate; bracts subulate, hairy; calyx broadly conical, 5–6 mm long, dark green, covered with long white hairs; calyx teeth 2–3 mm long, broadly triangular at base, subulate-pointed, the lower two somewhat spreading; corolla pinkish-violet, 10 mm long, the upper lip rather sparsely white-pubescent; nutlets 2–2.5 mm long. July–August.

- 154 Steppes, stony slopes, roadsides, river banks; also as a weed. — W. Siberia: Ob., Irt., Alt.; E. Siberia: Ang.-Say. Endemic. Described from garden-grown specimens. Type in London.

Note. Ledebour (Fl. Ross.) erroneously reported distribution of *L. tataricus* L. for European Russia, and this error has been repeated by other botanists (Fedchenko and Flerov, Stankov, and others). *L. tataricus* L. is a Siberian plant and does not

occur in the European part of USSR. This species is readily distinguishable from the sylvatic species *L. quinquelobatus* (commonly named *L. villosus*) that grows in the European part of the Soviet Union, and from the steppe species *L. glaucescens* Bge., by its glabrous stems (covered only in upper part and in inflorescence with long spreading hairs) and its glabrous, very finely dissected leaves.

7. *L. mongolicus* V. Krecz. et Kuprian. in Bot. mat. gerb. Bot. inst. AN SSSR, XI (1949) 137.

A slender, glabrous perennial; stems numerous, reddish, 40–60 cm long, rather sparsely leafy, simple or sparingly branching in upper part; leaves on petiole half the length of blade or somewhat longer, broad-ovate, truncate or subcordate at base, dissected into 5 oblong-rhomboid segments, these pinnatifid with linear-lanceolate lobes; floral leaves on petiole 1–2 cm long, tripartite with narrow linear segments; inflorescence short, with distant whorls; calyx 6 mm long, narrowly conical, straight, purple or blackish-green, completely glabrous, the teeth shortly triangular at base, abruptly terminating in a subulate point; corolla 8–10 mm long, pale violet, quite glabrous in upper part; nutlets completely glabrous at apex (as opposed to all other species of the genus). June.

Mountain slopes. — E. Siberia: Dau. Gen. distr.: Mong. Described from Mongolia. Type in Leningrad.

Series 4. *Panzerioides* V. Krecz. et Kuprian. — Leaves 2–4 cm broad; bracts soft; inflorescence short, tomentose or lanate; calyx teeth short, shortly subulate-pointed. The series contains a number of alpine and subalpine endemics of Central Asian mountain ranges and one species from N. Iran.

8. *L. panzerioides* M. Pop. in Addenda XIX, 650.

Perennial, with woody rhizome; stems numerous, 40–70 cm long, obscurely hairy on the ribs and faces; leaves glabrous or with inconspicuous appressed hairs and short glands on lower side, rounded in outline, subcordate at base, 3–4 cm broad, parted  
155 nearly to base into broad rhomboid segments, these pinnatifid with linear-lanceolate lobes; floral leaves 3-fid; inflorescence tomentose, short, with approximate whorls; bracts soft, filiform, hairy; calyx 5–6 mm long, conical, rather densely covered, especially in lower part, with long soft hairs; calyx teeth triangular at base, with a subulate point, the two lower teeth subpatent; corolla 10 mm long, pink, the heavily pubescent upper lip reddish; nutlets 3 mm long. July–August.

Alpine belt, on grassy slopes. — Centr. Asia: Syr D., Pam.-Al., T. Sh. (W.). Endemic. Described from Talasskii Alatau range. Type in Tashkent.

9. *L. incanus* V. Krecz. et Kuprian. in Bot. mat. gerb. Bot. inst. AN SSSR, XI (1949) 138. — *L. panzeriifolius* Ik.-Gal. nom. in herb.



A grayish-green perennial, with woody rhizome; stems numerous, 20–40 cm long, with short appressed hairs on the faces and ribs; leaves rather small, densely covered with gray hairs, glabrous on the veins; lower leaves ovate in outline, 2–3.5 cm long and 1–2 cm broad, obscurely cordate at base, dissected to the middle into 5 or 3 broad segments, these cut into broad obtusish lobes; petioles 3–4 cm long, densely hairy; leaves in inflorescence short-petioled, rhomboid in outline, cuneate at base, 3-fid, with lanceolate segments, narrowing to a short petiole; inflorescence with approximate whorls; bracts soft, thin, hairy; calyx campanulate, 8 mm long, puberulent, the broadly triangular teeth with a short subulate point; corolla pink, 10 mm long; nutlets 3–3.5 mm long. July.

Mountain slopes. — Centr. Asia: Dzu.-Tarb. Endemic. Described from Dzungarian Alatau. Type in Leningrad.

Subgenus 2. *Cardiochilium* V. Krecz. et Kuprian. In Addenda, 650. — Calyx obscurely bilabiate, the two lower teeth not spreading but longer than the three upper teeth; corolla tube not enlarged above the straight ring of hairs; lower lip straight, the middle lobe 3-lobulate, the middle lobule obcordate; upper lip ovate, galeate; leaves trisected or tripartite.

10. *L. macranthus* Maxim. Prim. Fl. Amur. (1859) 476; Kom. and Alis. Opređ. rast. Dal'nevost. kr. II, 904. — *L. japonicus* Miq. in Ann. Mus. Bot. Lugd.-Bat. II (1865–1866) 112. — *Cardiochilium macranthum* V. Krecz. et. Kuprian. nom. altern.

Perennial, with woody rhizome; stems 60–120 cm long, solitary, simple, rarely  
156 branched above, the faces sulcate, the ribs rounded, covered with short stiff appressed hairs; lower leaves ovate in outline, with cuneate square base, 3-lobed, the lobes shallowly incised, coarsely toothed; leaves in inflorescence lanceolate to lance-linear, the lower dentate, the upper entire, long-acuminate, scabrous on both sides, the upper side dark green, the lower paler, prominently veined; inflorescence long, with distant whorls; bracts subulate, hispid; calyx conical, 15–20 mm long, covered in middle part with long stiff bristles; teeth all upright, the two lower longer than the others; corolla 25–28 mm long, pink, the upper lip galeate, sparsely puberulent; lower lip one-third shorter, with purple middle lobe. July–September.

Meadow slopes and scrub on stony soil. — Far East: Uss. Gen. distr.: Japan and China. Described from N. China. Type in Leningrad.

11. *L. heterophyllum* Sweet, Brit. Fl. Gard. I (1823–1829) 197; Hort. Brit. ed. I (1827) 321. — *L. sibiricus* auct. fl. or. extr. non L. — *L. condensatus* Hornem. Hort. Hafn. II (1815) 557. — *L. mexicanus* Sesse. Moc. Fl. Mexic. ed. 2 (1894) 136. — *L. altissimus* Bge. ex Benth. Lab. Gen. et sp. (1832–1836) 521. — *L. pseudomacranthus* Kitagawa in Bot. Mag. Tokyo, XVIII (1934) 109. — *Cardiochilium heterophyllum* V. Krecz. et Kuprian. nom. altern. — Ic.: Kom. and Alis. Opređ. rast. Dal'nevost. kr. II, Plate 273.

Annual or perennial, with a woody taproot; stems 50–70 cm long, with sulcate faces, the ribs covered with short appressed hairs; leaves ovate in outline, cuneate at base, trisected, the oblong-rhomboid segments pinnatifid, with linear acuminate lobes; lower leaves in inflorescence trisected, with linear acuminate segments, the upper narrowly lanceolate, entire; upper side of leaves rough with short appressed hairs, the lower side paler, with very short appressed hairs; inflorescence long, with distant whorls; bracts short, half the length of calyx; calyx narrowly conical, 8 mm long, with somewhat prominent nerves, covered with short appressed hairs; teeth all upright, the lower two longer, gradually tapering from narrowly triangular base to a subulate point; corolla 9–10 mm long, lilac-rose, the upper lip slightly pubescent, the lower lip about equaling the upper, with purple middle lobe; nutlets 2 mm long. June–July.

Sands; often as weed. — Far East: Ze.-Bu., Uss. Gen. distr.: China (Manchuria), Japan, N., Centr. and S. Am. Described from S. Amur. Type in London.

- 157 12. *L. sibiricus* L. Sp. pl. (1753) 584; Benth. Lab. Gen. et sp. 520 (p.p.); Turcz. Fl. baic.-dah. II, 428; Kryl. Fl. Zap. Sib. IX, 2356. — *L. sibiricus*  $\beta$ . *grandiflorus* Benth. in DC. Prodr. XII, 502; Ldb. Fl. Ross. III, 425. — *L. multifidus* Desf. Tabl. II (1815) 270. — *L. occidentalis* Colla in Mém. Acad. Turin, XXXIII (1829) 154. — ? *L. manshuricus* Yabe, Ic. Fl. Mansh. I (1920) tab. 20. — *Panzeria tripartita* Moench, Meth. pl. (1794) 402. — ? *P. multifida* Moench, Meth. Suppl. (1802) 187. — *Cardiochilium sibiricum* V. Krecz. et Kuprian. nom. altern. — Ic.: Amman, Stirp. rar. 48, tab. 8.

Annual or biennial, with a woody root; stems numerous, 30–60 (100) cm long, with sulcate faces, covered with short appressed hairs, branching in upper part, rarely from base; leaves ovate in outline, cuneate at base, trisected into narrow oblong-rhombic segments, these dissected into linear tripartite lobules; floral leaves rhomboid in outline, trisected into linear segments, the middle segments usually 3-fid; upper side of leaves scabrous, the lower side hairy on the prominent veins; lower leaves marcescent; inflorescence long, with distant whorls; bracts subulate, shorter than calyx, covered with short appressed hairs; calyx tubular-campanulate, 8–9 (12) mm long, with long hairs in middle part; teeth short, the upper three upright, 1.5–2 mm long, abruptly attenuate from triangular base to a subulate point, the lower two twice as long, slightly spreading; corolla 15–20 mm long, pink, the upper lip galeate, the lower lip straight, two-thirds the length of the upper; nutlets 2.5 mm long. June–September.

Stony and steppe slopes, pine forests, rarely as weed. — W. Siberia: Alt.; E. Siberia: Dau. Gen. distr.: Mong. Described “from Siberia.” Type — a cited figure: Amman, l. c., tab. 8.

#### Genus 1275.\* *Panzeria*\*\* Moench

Moench, Meth. pl. (1794) 402. — *Generis leonurus* sect. *Panzeria* Pers. Syn. pl. II (1807) 126

\* Treatment by L. A. Kupriyanova.

\*\* Named for K. Panzer, a Nuremberg physician (1755–1829).

Verticillasters many-flowered, forming a large dense inflorescence; calyx tubular-campanulate, with 5 very prominent and 5 less conspicuous intermediate nerves, the teeth broadly triangular at base, subulate-pointed, the lower two longer; corolla yellow, 30–36 mm long; upper lip galeate, densely tomentose above; lower lip 3-lobed; 158 the middle lobe cordate; corolla tube without a ring of hairs; stamens parallel, subequal; nutlets trigonous, rounded at apex.

Plants of the mountainous steppe and desert regions of Siberia, Mongolia and Suiyuan (China).

Note. Beside the three species that occur in the USSR, the genus *Panzeria* contains two other species: *P. alaschanica* Kuprian. and *P. albescens* Kuprian. distributed in the desert areas of Ordos, Alashan and S. Mongolia.

**Economic importance.** Species of *Panzeria*, like motherwort, have an effect on the nervous and vascular systems. *Panzeria* is used for its properties in Tibetan medicine and in homeopathy.

1. Plants with sparse grayish indument; calyx teeth narrowly triangular, gradually subulate-pointed; verticillasters mostly distant . . . . . 3. *P. canescens* Bge.
- + Plants with dense white tomentum . . . . . 2.
2. Tomentum on stem floccose, loose; lower side of leaves sparsely hairy, the veins glabrous; calyx with long implexed silky hairs, the teeth narrowly triangular, gradually subulate-pointed, the upper 4 mm, the lower 7 mm long. . . . . 2. *P. lanata* (L.) Bge.
- + Tomentum on stems evenly distributed, dense; lower side of leaves, including veins, covered with dense white tomentum; calyx white-tomentose; the teeth short, broadly triangular, the upper 2–3 mm, the lower 4 mm long . . . . . 1. *P. argyracea* Kuprian.

1. *P. argyracea* Kuprian. in Bot. mat. gerb. Bot. inst. AN SSSR, XV (1953) 364. — *P. lanata* Bge. in Ldb. Fl. alt. II (1830) 410, non *Ballota lanata* L. — *Leonurus lanatus* auct. non Spr.: Ldb. Fl. Ross. III, 425, p. p.; Kryl. Fl. Zap. Sib. XI, 2357. — Ic.: Kuprian. op. cit. — Exs.: Gerb. Fl. SSSR, No. 3459, 3775a, b.

Perennial, with a stout woody taproot; stems numerous, 20–35 cm long, simple or sparingly branching in upper part, densely tomentose; leaves petiolate, firm, subcoriaceous, broad-ovate in outline, 3–5 cm across, dissected nearly to base into 5 cuneate segments, these cut in turn into lanceolate, subobtusate lobules; floral leaves smaller, trisected to the middle or slightly beyond into cuneate large-toothed segments; upper side of leaves green, with very short appressed hairs and sparse glands, the lower side densely white-tomentose, the veins concealed by tomentum; inflorescence spiciform, with more or less distant whorls; bracts subulate, tomentose; calyx tubular-campanulate, 13–18 mm long, densely tomentose, the upper teeth 2.5–3 mm long, the lower 4–5 mm long, broadly triangular, finely subulate-pointed; corolla pale yellow, 30–33 (35) mm long, white tomentose outside especially on upper lip; nutlets 2.5 mm long. July–August.

Steppe mountain slopes, rarely on sandstone or limestone. — W. Siberia: Alt.; E. Siberia: Ang.-Say. (W. part). Gen. distr.: Mong. (N.W.). Described from Tuvininskaya Province, Teri-Khol' Lake. Type in Leningrad.



2. *P. lanata* (L.) Bge. Fl. alt. II (1830) 410, quoad nomen. — *Ballota lanata* L. Sp. pl. (1753) 582. — *Panzeria tomentosa* Moench, Meth. pl. (1794) 402. — *Leonurus lanata* Pers. Syn. pl. II (1807) 126. — *L. lanatus* Spr. in Syst. veg. II (1825) 738; Turcz. Fl. baic.-dah. (1846) 429; Benth. in DC. Prodr. XII, 502; Ldb. Fl. Ross. III, 425, p.p. — **lc.**: Gmel. Fl. Sib. III, tab. 54 (1768) 241.

Perennial, with a stout woody taproot; stems numerous, 15–30 cm long, densely covered with silky hairs forming a transparent floccose tomentum; leaves petiolate, thin, rounded in outline, 3–3.5 cm across, dissected to base or sometimes to the middle into 5 rather broad cuneate segments, these cut in turn into lanceolate subobtusate lobes; floral leaves smaller, trisected, with large toothed segments, the upper side green, obscurely covered with sparse hairs and glands, the lower side grayish-green with long silky hairs, the veins prominent, glabrous; inflorescence spiciform, rather dense; bracts rigid, flanked with long silky hairs; calyx tubular-campanulate, 14–18 mm long, densely covered, especially beneath, with implexed silky hairs; upper teeth 4 mm long, the lower 7 mm long, narrowly triangular at base, finely subulate-pointed; corolla yellow, 30–36 mm long, the upper lip rather densely covered with silky hairs; nutlets 2–2.5 mm long. July.

Stony and steppe mountain slopes. — E. Siberia: Ang.-Say. (E. part), Dau. **Gen. distr.**: Mong. (N. E.). Described from Buryat-Mongolia. Type unknown.

3. *P. canescens* Bge. in Del. sem. hort. Dorpat. No. 15 (1839). — *Leonurus canescens* (Bge.) Benth. in DC. Prodr. XII (1848) 502, non. Dum. — *Leonurus bungeanus* Schischk. in Kryl. Fl. Zap. Sib. IX (1937) 2358.

Perennial, with woody rhizome; stems numerous, 30–35 cm long, rather sparsely covered with crisp hairs; leaves broad-ovate in outline, 3–4 cm across, pentasect, with cuneate segments, these cut in turn into linear subobtusate lobules; floral leaves smaller, trisected into cuneate large-toothed segments; upper side of leaves green, with very short  
160 scattered hairs, the lower side with short spreading hairs on veins and with numerous very short glands; inflorescence with distant whorls; bracts subulate, with sparse spreading hairs; calyx tubular-campanulate, to 15 mm long, with sparse crisp hairs; upper teeth 4–5 mm, the lower 6–7 mm long, narrowly triangular, finely subulate-pointed; corolla 25–30 mm long, yellow, the upper lip with rather long silky hairs. July.

Rocks, gravelly-stony mountain slopes. — W. Siberia: Alt. **Gen. distr.**: Mongolian Altai. Described from Katun'. Type in Leningrad.

Genus 1276.\* **Lagochilus**\*\* Bge.

Bge. in Benth. Lab. Gen. et sp. (1832–1836) 640.

Calyx tubular-campanulate, 5-nerved, with oblique or regular throat, 5-toothed, the teeth oblong, ovate-lanceolate or triangular, subulate-pointed, the upper sometimes

\* Treatment by O.E. Knorring.

\*\* From Greek lagos, hare, and chilos, lip, alluding to the shape of corolla.

longer than the lower; bracts subtending semiverticles and leaves sharply spinescent or subulate-pointed; corolla bilabiate, the tube with a ring of hairs inside near the base; upper lip (galea) oblong, erect, flat, densely hairy outside, notched at apex, with 2 lobes; lower lip oblong, 3-lobed, with short straight lateral lobes, the middle lobe larger, deeply bifid; stamens 4, as long as or shorter than corolla, the filaments glabrous or pubescent at base, the anthers approximate, hirsute; style lobes equal; nutlets sharply trigonous, truncate at apex.

1. Sterile shoots without thorny bracts in the axils . . . . . 2.
- + Both fertile and sterile shoots with thorny bracts in the axils . . . . . 11.
2. Calyx with erect or spreading teeth . . . . . 3.
- + Calyx infundibular, with recurved ovate teeth; plants covered with horizontally spreading hairs . . . . . 4. *L. inebrians* Bge.
3. Calyx teeth equal, erect or subpatent . . . . . 4.
- + Lower calyx teeth shorter than the upper, spreading or erect . . . . . 6.
4. Glabrous plants; calyx teeth 1.5 to 3 mm long, triangular, one-third to one-half the length of the tube, with a point the length of the tooth; leaves with spinescent lobes . . . . . 1. *L. acutilobus* (Ldb.) Fisch. et Mey.
- + Plants at least partly hairy; calyx teeth triangular, erect or subpatent . . . . . 5.
5. Plants covered with long hairs only in the floriferous part; calyx teeth erect, the tube densely hairy; leaves rather shallowly cut into ovate obtuse segments; upper leaves with acuminate segments . . . . . 3. *L. hirtus* Fisch. et Mey.
- + Stems glabrous or with scattered bristly hairs; calyx teeth subpatent, the tube glabrous or hispid; leaves deeply dissected or parted, the lobes short-acuminate, not point-tipped . . . . . 2. *L. setulosus* Vved.
6. Calyx teeth variable, triangular, equal and unequal on the same plant, in the latter case the lower teeth shorter; calyx teeth and leaf lobes long-spinescent; stems stout; plants densely covered with glandular and bristly hairs . . . . . 7. *L. subhispidus* Knorr.
- + Lower calyx teeth always shorter than the upper, narrowly lanceolate . . . . . 7.
7. Stems and branches slender, virgate, covered with appressed papillary and glandular hairs; leaves tripartite, with rounded or obtuse segments; calyx only in lower part with indument as on stems . . . . . 5. *kschtutensis* Knorr.L.
- + Glandular hairs absent; calyx teeth triangular or triangular-lanceolate; leaves spinous-tipped or mucronate, rarely obtuse . . . . . 8.
8. Calyx teeth narrowly triangular, subpatent, terminating in a long spine, about half the length of the tube; calyx patent-pubescent; leaves usually stoutly mucronate . . . . . 6. *L. pubescens* Vved.
- + Calyx tube glabrous; calyx teeth erect, triangular, one-fourth to one-third the length of the tube . . . . . 9.
9. Leaves broad-ovate or triangular in outline, pinnatifid, the segments subobtuse or terminating in a short spine . . . . . 8. *L. bungei* Benth.
- + Leaves cuneate-rhomboid in outline, 3–5-lobed, the lobes triangular, terminating in a stout spine; calyx teeth one-half to two-thirds the length of the tube . . . . . 10.

10. Leaves sparsely pubescent above, more densely pubescent and prominently  
162 veined beneath, the teeth triangular-lanceolate, 8–10 mm long including spine;  
middle lobe of lower lip shallowly emarginate . . . . . 10. *L. androssovii* Knorr.
- + Leaves glabrous on both sides; calyx teeth oblong-lanceolate, 9–12 mm long  
including spine; corolla pale yellow, the middle lobe of lower lip deeply notched  
. . . . . 11. *L. ilicifolius* Bge.
- + Calyx teeth triangular, 3–5 mm long including spine; corolla pink . . . . .  
. . . . . 9. *L. pungens* Schrenk.
11. Calyx teeth 4, oblong, 17–27 mm long and 3 mm broad, one-third to one-half  
the length of the tube; whorls 2-flowered; leaves twice or three times pinnatifid  
. . . . . 22. *L. paulsenii* Briq.
- + Calyx with 5 teeth . . . . . 12.
12. Calyx teeth oblong, broadly lanceolate or linear-lanceolate, nearly always longer  
than the tube . . . . . 13.
- + Calyx teeth broadly triangular or broad-ovate, shorter than the tube, rarely as  
long . . . . . 22.
13. Calyx strongly oblique at throat, the lower teeth much shorter than the upper  
. . . . . 14.
- + Calyx slightly oblique at throat, the teeth subequal . . . . . 17.
14. Calyx teeth broadly lanceolate, the lower 7–9 mm, the upper 15–20 mm long;  
leaves 3–5-partite, with obtuse or rounded segments . . . . .  
. . . . . 14. *L. knorringianus* Pavl.
- + Calyx teeth broadly oblong, the lower 10–13 mm, the upper 13–15 mm long  
. . . . . 15.
15. Leaves doubly pinnatisect, the segments 1–2 mm broad, obtuse or rounded at  
apex, rarely point-tipped; calyx teeth 10–13 mm long, 5–6 mm broad, the tube  
curved; whorls 4-flowered; corolla not exerted . . . . . 15. *L. nevskii* Knorr.
- + Leaves 3–5-parted, the segments 2–4.5 mm broad, subulate-pointed, with spine  
1 mm long; calyx teeth 9–12 mm long and 3–4.5 mm broad; whorls 6-flowered;  
corolla one-and-a-half times twice as long as calyx . . . . . 16.
16. Calyx-tube scabrous, with hairs in lower part, at length sometimes glabrescent;  
calyx teeth spinescent . . . . . 11. *L. diacanthophyllus* (Pall.) Benth.
- + Calyx-tube glabrous, the teeth obtusish; corolla 2½–3 times as long as calyx  
. . . . . 13. *L. leiacanthus* Fisch. et Mey.
17. Calyx-teeth linear-lanceolate or linear, 2–5 mm broad; leaves 3–5-partite or  
163 pinnately ternate, the narrowly linear or oblong segments acuminate or spines-  
cent . . . . . 18.
- + Calyx-teeth broadly oblong or oblanceolate, 4–6 mm broad; leaves doubly pin-  
natisect, the broader oblong segments rounded at apex . . . . . 21.
18. Calyx-teeth linear-lanceolate, 23–27 mm long and 2 mm broad; calyx covered  
along the nerves with bristly, articulate and glandular hairs; leaves pinnately  
ternate, with narrow linear acuminate segments; whorls 4–6-flowered . . . . .  
. . . . . 16. *L. longidentatus* Knorr.
- + Calyx-teeth oblong, linear or lanceolate, 11–18 mm long; whorls 2–6–8-  
flowered . . . . . 19.



19. Whorls 4–6-flowered; leaves broadly rhomboid in outline, on petiole 10–15 mm long, glabrous beneath, with scattered glandular and papilliform hairs above . . . . . 18. *L. tianschanicus* Pavl.
- + Calyx-teeth lanceolate, 15–16 mm long and 3 mm broad; whorls 2-flowered; leaves with scattered 1–3-jointed hairs above and beneath . . . . . 20.
20. Leaves on petiole 10–15 mm long; calyx-teeth one-and-a-half to twice as long as the tube; calyx-tube covered with multiarticulate and glandular hairs; corolla twice as long as calyx; bracts acicular, thin, 18–21 mm long, covered with articular, papilliform and glandular hairs . . . . . 19. *L. balchanicus* Czerniak.
- + Leaves subsessile; calyx-teeth three times as long as the tube; calyx-tube glabrous; whorls 6–8-flowered; bracts thick, 8–15 mm long, with articulate hairs only at base . . . . . 17. *L. cabulicus* Benth.
21. Leaves rhomboid in outline, on petiole 10–25 mm long; calyx-teeth broadly oblong, 12–18 mm long and 5–6 mm broad, as long to one-and-a-third as long as the tube; corolla pale pink . . . . . 20. *L. seravschanicus* Knorr.
- + Leaves obovate in outline, short-petioled; calyx-teeth oblanceolate, 15–17 mm long and 4–5 mm broad, attenuate at base to 2 mm, twice to three times as long as the tube; corolla yellowish or creamy . . . . . 21. *L. usunachmaticus* Knorr.
22. Calyx-teeth broadly triangular, sometimes obsolescent, confluent, 13 mm long and 16 mm broad; calyx-tube 20–25 mm long; leaves pinnatisect . . . . . 23. *L. platycalyx* Schrenk.
- 164 + Calyx-teeth broadly ovate, shorter than the tube, 4.5–12 mm long; calyx-tube 16–17 mm long . . . . . 23.
23. Calyx-teeth one-third to two-fifths the length of the tube . . . . . 24.
- + Calyx-teeth as long as or slightly shorter than the tube . . . . . 25.
24. Calyx tubular-campanulate, hispid, the teeth broad-ovate, 6–8 mm long and 5 mm broad, obliquely truncate at apex, with spine ca. 1 mm long . . . . . 27. *L. kaschgaricus* Rupr.
- + Calyx campanulate, glabrous, the teeth ovate, 6–7 mm long, 6 mm broad, rounded at apex . . . . . 25. *L. pulcher* Knorr.
25. Calyx-teeth ovate, subtriangular at apex, 6–7 mm long and 4–5 mm broad; calyx-tube tomentose . . . . . 26. *L. platyacanthus* Rupr.
- + Calyx-teeth broad-ovate, 8–12 mm long and 8–9 mm broad; calyx-tube covered with thick flexuous articulate and glandular hairs . . . . . 24. *L. macrodontus* Knorr.

Section 1. *Inermes* Fisch. et Mey. Enum. pl. nov. (1841) 30. – Sterile shoots without thorny bracts in the axils.

Series 1. *Brevidentati* Knorr. – Calyx-teeth triangular, one-fourth to one-half the length of the tube.

1. *L. acutilobus* (Ldb.) Fisch. et Mey. Enum. pl. nov. (1841) 31; Benth. in DC. Prodr. XII, 516. — *Molucella acutiloba* Ldb. in Eichw. Plant. nov. fasc. tab. XXXV (1831–1833) 39.

Perennial, with multicapital root; stems numerous, woody at base, simple or branched, glabrous; leaves rhomboid in outline, deeply lobed, the lobes triangular or broadly lanceolate, terminating in a spine 1.5–2 mm long; radical leaves on petiole 7–9 mm long; floral leaves on dilated petiole 3–5 mm long or sessile; semiverticels 4–6-flowered; bracts thin, subulate, reclinate, glabrous; calyx narrowly campanulate, glabrous, the teeth triangular, 1.5–2 mm long, one-third to one-half the length of the tube, produced into a spine 1–1.5 mm long; corolla pale pink, one-and-a-half times as long as calyx; upper lip (galea) with 2 oblong lobes; lower lip 3-parted, shortly emarginate, with ovate segments, the lateral lobes obovate; filaments and style included in corolla. August–September. (Plate IX, Figure 1.)

Semideserts, in wormwood-saltwort, wormwood-forb and wormwood-grass associations. — Centr. Asia: Ar.-Casp. Endemic. Described from eastern coast of the Caspian Sea. Type in Leningrad.

165 2. *L. setulosus* Vved. sp. n. in Addenda XX, 650. — *L. hirtus* Lapin in Oprod. rast. okr. Tashk. I (1938) 253, non Fisch. et Mey. (1841).

Perennial; stems woody at base, slender, erect, simple or branched, glabrous or covered with scattered spreading bristles, becoming white, shiny, 30–80 cm long; leaves rhomboid to broad-ovate in outline, deeply dissected or parted, the lobe abruptly short-pointed but not mucronate, glabrous; petioles long, narrowly winged, those of middle and upper leaves shorter; flowers sessile; whorls 4–6-flowered, in the axils of upper leaves; bracts thin, acicular, horizontally spreading, spiny, glabrous or with isolated bristles; calyx narrowly campanulate, with slightly spreading teeth (without distinct limb), sometimes slightly curved, glabrous or more often with setulose tube; calyx-teeth narrowly triangular, spinescent, the lower teeth 15–25 mm long, approximately two-fifths the length of the tube; corolla white with brownish speckles, 23–30 mm long, the upper lip with long straight hairs; nutlets glabrous, 4–5 mm long. May–September.

Clayey slopes and escarpments in foothills. — Centr. Asia: Syr D. Endemic. Described from Chirchik. Type in Tashkent.

3. *L. hirtus* Fisch. et Mey. Enum. pl. nov. (1841) 33; Benth. in DC. Prodr. XII, 516; Ldb. Fl. Ross. III, 433; Kryl. Fl. Zap. Sib. IX, 2362.

Perennial, 15–20 cm high; stems numerous, woody from base, divaricate, glabrous or with scattered hairs in lower part, with stiff long hairs in floriferous part; leaves cuneate, glabrous, shallowly 3–5-fid, the segments ovate, obtusish, only those of upper leaves acuminate; bracts 8–10 mm long, subulate-spinescent, densely covered with long setiform, thick 2–3-jointed and capitate glandular hairs; semiverticels 6–8-flowered; calyx tubular-campanulate, densely covered with thick 1–4-jointed and moniliform articulate hairs; calyx teeth narrowly triangular, 3–4 mm long, one-third to one-half the length of the tube; corolla pink, twice as long as calyx; upper lip cut

to one-third into two oblong segments; lower lip 3-parted, the middle lobe shortly emarginate, with broadly ovate segments, the lateral lobes ovate; filaments shorter than corolla; nutlets eglandular. May—August.

Foothills and submontane zone, in wormwood and wormwood-saltwort associations.— Centr. Asia: Balkh. Gen. distr.: Dzu.-Kash. Described from the vicinity of Lake Zaisan. Type in Leningrad.

Series 2. *Inebriantes* Knorr. — Calyx-teeth broad-ovate, recurved; stem and calyx covered with horizontally spreading articulate and glandular hairs.

166 4. *L. inebrians* Bge. in Mém. sav. etr. VII (1854) 438.

Perennial, 25-40 cm high; stems numerous, woody at base, simple or branched, densely leafy and densely long-haired, the hairs horizontally spreading, 1-3-jointed, interspersed with numerous capitate sessile glandular hairs; leaves broad-ovate in outline, cuneate at base, 3-5-parted, the lobes broad-ovate, rounded or toothed; petioles densely beset with 2-3-jointed spreading hairs, the lower 1.5-2 cm, the upper dilated, 2-5 mm long; both leaf sides covered with scattered 1-2-jointed spreading hairs and glands; semiverticels 4-6-flowered; bracts firm, reclinate, trigonous, subulate, covered with long 2-3-jointed spreading and sessile capitate glandular hairs; calyx campanulate-infundibular; calyx-teeth recurved, broad-ovate or broadly triangular, 5-6 mm long, spiny-pointed, the spine 1-1.5 mm long; calyx-tube covered with short 1-2-jointed thick hairs interspersed with sparse 3-5-jointed slender and numerous sessile capitate-glandular hairs; corolla pale pink, as long to one-and-a-half times as long as calyx. June—August.

Submontane plains and low foothills, on pebble-beds and fluvial outwash, gravelly slopes, in wormwood-grass and wormwood-forb associations. — Centr. Asia: Pam.-Al. Endemic. Described from Samarkand area. Type in Leningrad.

Note. A.I. Vvedenskii reported a species *L. gypsaceus* Vved. from the Kashka and Surkhandar'ya river basins, closely resembling *L. inebrians* and differing from it in having patent downy pubescence and not horizontally spreading long stiff hairs.

**Economic importance.** The plant contains lagochilin, an alkaloid of medicinal value. (Byull. SAGU, No. 23, 1945; Farmakologiya i toksikologiya 1951, No. 6.)

Series 3. *Kschtutenses* Knorr. — Calyx-teeth shorter than the tube, unequal, triangular or lanceolate, terminating in spine 2-4 mm long.

5. *L. kschutensis* Knorr. in Tr. Tadzh. bazy AN SSSR, VIII (1938) 625.

Perennial, 15-25 cm high, with a stout root; stems slender, virgate, brown, covered with small papilliform and capitate glandular hairs, densely leafy; leaves triangular, on rather long petiole, with rounded or obtuse segments; bracts lanceolate, 5-6 mm long, 167 with similar indument; semiverticels 6-flowered; calyx covered in lower part with papilliform and capitate glandular hairs, glabrous above; calyx-teeth narrowly lanceolate,



5 mm long, one-third to one-half the length of the tube, terminating in a spine 1–1.5 mm long; corolla pale pink, one-and-a-half times as long as calyx; upper lip shallowly cut into two oblong-ovate segments; lower lip tripartite, the middle lobe slightly notched with small ovate lobules, the lateral lobes oblong; filaments slightly shorter than corolla; nutlets eglandular. June–July.

Low and high foothills, in gravelly places. — Centr. Asia: Pam.-Al. Endemic. Described from the vicinity of Kshtut. Type in Leningrad.

6. *L. pubescens* Vved. sp. n. in Addenda XX, 651.

Perennial; stems woody at base, erect, simple or branched, with short patent hairs, at length often partially glabrescent, becoming white, shiny, 15–50 cm long; leaves rhomboid, broad-ovate, orbicular or subspatulate in outline, obtuse, cuneate at base, lobate or parted, densely patent-pubescent, the lobes usually terminating in a very short stoutish mucro, the lower long-petioled, the petioles of middle and upper leaves shorter, very narrowly winged; flowers in 4–6-flowered semiverticels in the axils of upper leaves; bracts thin, acicular, horizontally spreading, spinescent, patent-pubescent, glabrous at apex; calyx narrowly campanulate, often slightly curved, with subpatent teeth (often without a pronounced limb); lower teeth (14) 18–24 mm long; calyx patent-pubescent, very rarely intermixed on the tube with few bristles, the narrowly triangular teeth about half the length of the tube, terminating in a long spine; corolla white or pink, with brownish nerves, 22–28 mm long, the tube long-exserted; upper lip covered with long straight hairs; nutlets glabrous, 4 mm long. June–August.

Outcrops of mottled rocks. — Centr. Asia: Syr D. Endemic. Described from the Fergana area. Type in Tashkent.

7. *L. subhispidus* Knorr. in Tr. Bot. inst. AN SSSR, I, 1 (1933) 169. — Ic.: op. cit.

Perennial, 25–30 cm high; roots stout; stems numerous, coarse, woody from base, whitish, branched, densely covered with 3–5-jointed hairs, more sparsely in lower part; leaves 3–5-lobate, cuneate at base, the radical long-petioled, 17–20 mm long; the cauline leaves on dilated petioles 4–9 mm long, covered with 3–6-jointed and glandular hairs, blades rhomboid in outline, cuneate at base, the lobes shortly triangular, terminating  
168 in a stout spinous point 1.5–2.5 mm long; upper side of leaves with scattered short appressed hairs and copious capitate-glandular hairs; lower side densely covered on the veins with 3–7-jointed and sessile capitate-glandular hairs; bracts mostly appressed to the whorls, subulate-spinescent, 10–12 mm long, covered with 3–7-jointed and capitate hairs; calyx tubular-campanulate, slightly oblique at throat, densely covered with similar indument; calyx-teeth triangular, 5–7 mm long, subulate-pointed, one-half to three-fourths the length of the tube, with spine 1.5–2.5 mm long. May–July.

Foothills, on gravelly soils, in wormwood associations. — Centr. Asia: Kyz. K., T. Sh. (W.). Endemic. Described from Karatau Mountains. Type in Leningrad.

Note. Plants collected in the Kyzyl-Kum are on residual buttes, differ slightly from *L. hispidus* in the larger size and the distinctive indument of calyx; this needs further study.

8. *L. bungei* Benth. Lab. Gen. et sp. (1832–1836) 641; DC. Prodr. XII, 516; Fisch. et Mey. Enum. pl. nov. 32; Ldb. Fl. Ross. III, 433; Kryl. Fl. Zap. Sib. IX, 2362. — *L. diacanthophyllus* Bge. ex Benth. l. c. (1832–1836) 641. — *Moluccella grandiflora* Bge. in Ldb. Fl. alt. II (1830) 418, non Steph. — Ic.: Ldb. Ic. Fl. Ross. V, tab. 436.

Perennial, 15–40 cm high, with a stout root; stems numerous, simple or branched, covered with scattered curved hairs; leaves broad-ovate or triangular in outline, pinnatifid, with obtuse or short-pointed lobes, the lower on petiole 2–2.5 cm long, the cauline on petiole 5–8 mm long; semiverticels 8–10-flowered; bracts 6–16 mm long, very sparsely hairy or glabrous; calyx tubular-campanulate, with sparse hairs or glabrous; calyx-teeth triangular, 4.5–5 mm long, one-fourth to one-third the length of the tube, terminating in a spine 2–3 mm long; corolla pale pink; upper lip deeply cut into two oblong obtuse lobes; lower lip tripartite, scarcely emarginate, with broadly oblong lobes, the lateral lobes oblong; filaments nearly equaling the corolla; nutlets eglandular. June–July.

Submontane plains and foothills, on sandy soils, in wormwood-saltwort and wormwood-forb associations. — Centr. Asia: Balkh. Endemic. Described from Lake Zaisan. Type in Leningrad.

9. *L. pungens* Schrenk in Bull. Phys.-math. Acad. Petersb. II (1844) 125; Ldb. Fl. Ross. III, 433; Kryl. Fl. Za. Sib. IX, 2363. — *L. bungei*  $\gamma$ . minor Fisch. et Mey. Enum. pl. nov. (1841) 32.

169 Perennial, 15–25 cm high, with vertical root; stems numerous, woody from base, divaricately branched, covered with horizontally spreading stiff hairs; leaves coriaceous, cuneate, glabrous, glandular on both sides, the lobes triangular or rounded, abruptly terminating in a spine 2–2.5 mm long; semiverticels 6–10-flowered; bracts 7–12 mm long, linear-subulate, sparsely covered with horizontally spreading hairs; calyx tubular-campanulate, the teeth triangular, 3–5 mm long, with spine 2.5 mm long, the teeth including spine two-thirds the length of the tube, the lower part of the tube sparsely hairy; corolla pink, twice as long as calyx; upper lip shallowly cut into two linear lobes; lower lip tripartite, the middle lobe deeply emarginate, with short ovate lobules, the lateral lobes ovate-triangular; filaments equaling the corolla; nutlets eglandular. May–July.

Submontane areas and foothills, sandy deserts, in wormwood and wormwood-saltwort associations. — Centr. Asia: Balkh. Gen. distr.: Sintsiang. Described from Lake Zaisan. Type in Leningrad.

10. *L. androssovii* Knorr. in Bot. mat. gerb. Bot. inst. AN SSSR, XV (1953) 340.

Perennial, 15–19 cm high, divaricately many-stemmed from base; stems whitish, densely leafy; leaves cuneate-rhomboid in outline, 3–5-lobed, the lobes triangular, terminating in a stout spine 2.5–3 mm long, the lower on petiole 15–16 mm long; floral leaves short-petioled, trilobate, the middle lobe much broader than the lateral; upper side of leaves with scattered hairs and glands; lower side prominently veined, more profusely hairy and glandular; semiverticels 6-flowered; bracts subulate-acicular,

equaling or exceeding the semiverticels, with sparse 2–3-jointed hairs at margin; calyx with slightly oblique throat, tubular-campanulate, with scattered bristly hairs, the teeth triangular-lanceolate, two thirds the length of the tube, with spine 3–4 mm long; corolla pale pink; upper lip with long hairs at margin above, cut into 2 oblong lobes; lower lip subglabrous outside, the middle lobe shortly notched, with ovate lobules, the lateral lobes ovate-oblong; filaments pubescent, exserted. May.

Low foothills, on gravelly slopes. — Centr. Asia: T. Sh. (W.) Endemic. Described from Karatau Mountains. Type in Leningrad.

11. *L. ilicifolius* Bge. in Benth. Lab. Gen. et sp. (1832–1836) 641 et in DC. Prodr. XII, 515.

Perennial; stems several, woody at base, divaricate, branched, glabrous in lower part, 170 puberulent under the inflorescence, 10–20 cm long; leaves stiff, glabrous on both sides, subsessile, upright, cuneate-rhomboid in outline, 3–5-toothed, the teeth finely spinous-tipped; flowers in 2's to 4's in the axils of upper leaves; bracts upright, thin, 7–11 mm long, glabrous; calyx tubular-campanulate, glabrous, the teeth oblong-lanceolate, unequal; corolla ochroleucous, exserted; upper lip shortly 2–3-fid; lower lip trilobate, deeply notched, with two broadly oblong lobes. June–July.

Rocky slopes. — W. Siberia: Ang.-Say. (Tuvinskaya province). Gen. distr.: Mong. Described from S.E. Mongolia. Type in Leningrad.

Section 2. **Spinosi** Fisch et Mey. Enum. pl. nov. (1841) 28. — Both fertile and sterile shoots with thorny bracts in the axils.

Series 1. *Diacanthophylli* Knorr. — Calyx-teeth as long to one-and-a-half times as long as the tube; corolla one-and-a-half to three times as long as calyx; leaves sparingly dissected, glandular-hairy beneath, the ovate or oblong segments subulate-pointed.

12. *L. diacanthophyllus* (Pall.) Benth. Lab. Gen. et sp. (1832–1836) 641; Fisch. et Mey. Enum. pl. nov. 28; Benth. in DC. Prodr. XII, 514; Ldb. Fl. Ross. III, 432; Kryl. Fl. Zap. Sib. IX, IX, 2361. — *L. occultiflorus* Rupr. Sert. tiansch. (1869) 67. — *Moluccella diacanthophylla* Pall. in Nova Acta Acad. Petrop. X (1797) 380, tab. 11. — *M. grandiflora* Steph. ex Willd. Sp. pl. III (1800) 130. — Ic.: Pall. l. c.; Ldb. l. c. pl. Fl. Ross. tab. 436.

Perennial, 10–30 cm high, with a short vertical root; stems subdivaricately branched from base, densely leafy, pubescent; leaves broad-ovate, cuneate at base, trisected, the lobes cut into numerous lobules, these oblong, rounded at apex, with a short spinule; lower leaves on petiole 5–10 mm long, the upper leaves mostly sessile; upper side of leaves prickly-haired, the lower side glandular; semiverticels 6-flowered; bracts whitish, subulate-pointed, 3–15 mm long, the margin beset with sparse patent hairs; calyx



narrowly tubular-campanulate, slightly oblique at throat, patent-hairy or glabrous in lower part; calyx-teeth oblong, 9–12 mm long and 3–5 mm broad, as long to one-and-a-half times as long as the tube; corolla pale pink, dark-striped, one-and-a-half times to  
171 twice as long as calyx; upper lip puberulent outside, with short soft hairs at margin, shortly notched, with oval lobes; lower lip shallowly notched with broadly obovate segments, the lateral lobes oblong; nutlets glandular at apex. Fl. June.

Submontane plains, on pebble-beds or gravelly soils. — Centr. Asia: Dzu.-Tarb., Syr D., T. Sh. Endemic. Described from Tarbagatai foothills. Type in Leningrad.

13. *L. leiacanthus* Fisch. et Mey Enum. pl. nov. (1841) 29; Benth. in DC. Prodr. XII, 514; Ldb. Fl. Ross. III, 432; Kryl. Fl. Zap. Sib. IX, 2361. — *L. diacanthophyllus* Bong. et May. Verz. am Saissang-Nor gesammelten. Pfl. (1841) 55, non Benth.

Perennial, 15–25 cm high, with a stout vertical root; stems several, erect, leafy from base, sparsely covered with short retrorse hairs; leaves with petiole 3–5 mm long or sessile, rhomboid in outline, cuneate at base, 3–5-lobate, the lobes cut into ovate-oblong subulate-pointed lobules with spine 1.5–2 mm long; upper side of leaves glabrous or with scattered prickly hairs, lower side glandular-hairy; semiverticels 6-flowered; bracts 4–12 mm long, subulate, glabrous; calyx tubular-campanulate, glabrous, the teeth oblong, rounded at apex, 8–12 mm long and 4 mm broad (with spine 1–1.5 mm long), as long to one-and-a-half times as long as the tube; corolla pink, 2½–3 times as long as calyx; upper lip cut into oblong lobes, pubescent above; lower lip 3-lobed, the middle lobe notched, with ovate lobules, the lateral lobes short, oblong June–August.

Stony and gravelly mountain slopes. — Centr. Asia: Dzu.-Tarb., Balkh. Gen. distr.: Dzu.-Kash. Described from Lake Zaisan area. Type in Leningrad.

Note. Forms intermediate between *L. diacanthophyllus* (Pall.) Benth. and *L. leiacanthus* Fisch. et Mey. occur in Lake Balkhash area and in Tarbagatai foothills.

Series 2. *Inaequidentati* Knorr. — Calyx throat more or less oblique; lower calyx-teeth shorter than the upper; calyx-tube sparsely hairy; leaves pinnatipartite or pinnatisect, glabrous or with scattered hairs.

14. *L. knorringianus* Pavl. in Byull. Mosk. obshch. isp. prir. XLVII, 1 (1938) 383. — Ic.: Knorr. in Bot. mat. gerb. bot. inst. AN SSSR, IX, 1–3, 58.

172 Perennial, 15–35 cm high, with vertical root, densely leafy; stems numerous, with scattered hairs in lower part, densely covered under the nodes with short appressed articulate hairs intermixed with sessile capitate-glandular and scattered moniliform hairs; leaves 5-parted, the oblong segments rounded at apex or obtuse, revolute-margined, both sides very sparsely covered with short bristly hairs, the margin with short, apically tickened, articulate, and sessile capitate-glandular hairs; flowers in approximate 4–6-flowered semiverticels; bracts (thorns) 8–20 mm long, under the semiverticels mostly suberect, sparsely covered with 1–2-jointed and short papilliform

hairs; calyx subtubular, with strongly oblique throat, covered on the nerves with very short 1–2-jointed and stipitate capitate-glandular hairs; teeth broadly lanceolate,  $2\frac{1}{2}$ –3 times as long as the tube, the lower 7–9 mm, the upper 15–20 mm long; corolla pink, as long to one-and-a-third as long as calyx; upper lip shortly cut into two lobes, hairy above; lower lip 3-parted, the middle lobe deeply notched, with 2 broad-ovate lobules, the lateral lobes oblong-lanceolate. June–July.

Mountain areas at altitudes between 300 and 1000 m, on stony slopes. — Centr. Asia: Syr D., T. Sh. (W.). Endemic. Described from Karatau Mountains, near Tyul'-kubas. Type in Moscow.

15. *L. nevskii* Knorr. in Tr. Bot. inst. AN SSSR, IV ser. 1 (1937) 328.

Perennial, 15–17 cm high, with a stout multicapital root; stems woody at base, erect, glabrous, with scattered hairs in upper part, leafy; leaves broadly rhomboid in outline, doubly pinnatisect, with oblong shortly point-tipped segments, glabrous on both sides, the margin with short papilliform and sessile capitate-glandular hairs; semiverticels 2–4-flowered; bracts 12–15 mm long, reclinate, with bristly hairs at base; calyx narrowly campanulate, slightly oblique at throat, the tube slightly curved, lilac-brown, covered with thick 2–3-jointed and 1-jointed hairs, the teeth oblong, rounded at apex, unequal, 10–13 mm long and 5–6 mm broad; corolla pale pink, slightly longer than calyx; upper lip shortly emarginate, fringed at apex, hairy above and at margin; 175 lower lip 3-lobed, the middle and lateral lobes ovate; upper filaments nearly as long as corolla. June–July.

Upper mountain belt, on limestone at altitudes of 2700–3000 m. — Centr. Asia: Pam.-Al. Endemic. Described from Kugitang. Type in Leningrad.

Series 3. *Longidentati* Knorr. — Calyx-teeth lanceolate or oblong, twice to three times as long as the tube; leaves tripartite or pinnately ternate.

16. *L. longidentatus* Knorr. in Bot. zhurn. SSSR, XXIII, 3 (1938) 217. — Ic.: op. cit. 218.

Perennial, 5–7 cm high, with a stout vertical root; stems numerous, divaricate, covered with 1–2-jointed and short spreading bristly hairs as well as stipitate capitate-glandular hairs; leaves subsessile or short-petioled, pinnately ternate, rhomboid in outline, the segments narrowly linear, acuminate, sparsely hairy above, densely covered on the veins and at margin beneath with thickened, distally attenuate hairs; semiverticels 4–6-flowered; bracts sharply spinous, 9–12 mm long, with long, 1–2-jointed and glandular hairs; calyx tubular, covered on the nerves and at margin with bristly and 1–2-jointed hairs interspersed with scattered capitate-glandular hairs; calyx-teeth linear-lanceolate, equal, 23–27 mm long and 2 mm broad,  $2\frac{1}{2}$ –3 times the length of tube; corolla creamy or pale yellowish; upper lip cut into two fringed lobes; lower lip 3-lobed, the middle lobe 2- or 3-toothed. July.

Gravelly mountain slopes. — Centr. Asia: T. Sh. Endemic. Described from Karatau Mountains, Kul'denen-Sai peak. Type in Leningrad.



PLATE IX. 1 – *Lagochilus acutilobus* (Ldb.) Fisch. et Mey., general aspect, flower; 2 – *L. seravschanicus* Knorr., upper part of stem, flower; 3 – *L. pulcher* Knorr., upper part of stem, flower.



17. *L. cabulicus* Bent. in DC. Prodr. XII (1848) 515; Boiss. Fl. or. IV, 769; Grossg. Oprel. rast. Kavk. 336. — *L. cabulicus* Benth. var. *turcomanicus* Bornm. et Sint. in herb. — Exs.: Sint. It. transc.-pers. No. 1717, 807.

Perennial, 14–25 cm high; stems erect, partly divaricate, glabrous in lower part, covered under the inflorescence with scattered papilliform hairs; leaves subsessile, oval in outline, 3–5-fid, the oblong or linear segments obtuse, the margin with sparse thick and capitate-glandular hairs; semiverticels 6–8-flowered; bracts thick, 8–15 mm long, hairy only at base, more slender in the leaf axils of sterile shoots, 3–5 mm long; calyx 176 campanulate, not oblique at throat, glabrous; teeth equal, lanceolate, 5–16 mm long, three times the length of tube, terminating in a spine ca. 1.5 mm long; corolla pale pink, slightly exceeding the calyx. June–July.

Stony places on mountain slopes. — Caucasus: S. Transc.; Centr. Asia: Mtn. Turkm. Gen. distr.: Iran, Afghanistan. Described from Kabul. Type in London; cotype in Leningrad.

18. *L. tianschanicus* Pavl. in Byull. Mosk. obshch. isp. prirodozn. XLVII (1858) 83.

Perennial, 15–25 cm high, with a stout root; stems numerous, subglabrous, erect or spreading, the woody base with numerous remnants of old shoots; lower petioles 10–15 mm, the upper 4–5 mm long; leaves broadly rhomboid in outline, doubly dissected, the segments dissected in turn, oblong, obtuse or (the upper) acuminate, glabrous beneath, sparsely papillose-hairy above, the margin with papilliform and sessile capitate-glandular hairs; semiverticels 4–6-flowered; bracts with scattered 1–2-jointed hairs, 5–20 mm long, horizontally spreading, the lower not spreading; calyx narrowly campanulate, glabrous, scarcely beveled at throat; teeth equal, linear, 11–18 mm long and 4–5 mm broad, one-and-a-half times as long as the tube; corolla pink, one-and-a-half times as long as calyx or longer; upper lip cut into 2 or 3 lobes; lower lip with oblong-ovate lobes. June–July.

Middle and upper mountain zones, on gravelly slopes. — Centr. Asia: T. Sh. Endemic. Described from Talasskii Alatau, near Topchak-Su river. Type in Moscow.

19. *L. balchanicus* Czerniak. in Fedde, Repert. XXVII (1930) 278.

Perennial, to 20 cm high, with numerous, partly dead, stems from base; stems leafy from base, covered with scattered appressed articulate hairs, the margin also with capitate-glandular hairs; leaves obovate in outline, parted into oblong acuminate segments, covered above on the veins and beneath with scattered 1-jointed and 3-jointed hairs, the margin with capitate-glandular hairs; all leaves short-petioled; semiverticels 2-flowered; bracts 18–21 mm long, thin, acicular, under the semiverticels suberect; thorny bracts in the leaf axils horizontally spreading, covered with 1-jointed papilliform and capitate-glandular hairs; calyx narrowly tubular, almost regular, covered 177 with similar as well as 3–6-jointed moniliform hairs; calyx-teeth lanceolate, one-and-a-half times as long as the tube; upper lip of corolla with 2 oblong-ovate lobes; lower lip 3-lobed, the middle lobe shortly emarginate, the lateral lobes oblong. June.

Stony mountain slopes. — Centr. Asia: Mtn. Turkm. Endemic. Described from B. Balkhany Mountains.

Series 4. *Pinnatifidi* Knorr. — Leaves twice to three times pinnatifid, glabrous on both sides; calyx-teeth oblong or oblong-oblong, as long to one-and-a-half times as long as the tube; calyx-tube glabrous.

20. *L. seravschanicus* Knorr. in Bot. mat. gerb. Bot. inst. AN SSSR, 7 (1936) 193. — *L. schugnanicus* Knorr. op. cit.

Perennial, 14–15 cm high, with a stout root; stems numerous, erect or prostrate, densely leafy from base, glabrous or sparsely pubescent; leaves rhomboid in outline, bipinnate, the narrow oblong segments rounded at apex, ciliate; all leaves glabrous on both sides, the lower on petiole 10–25 mm long, the upper on petiole 5–8 mm long; semiverticels 4–6-flowered; bracts under the inflorescence subulate, thick, 10–20 mm long, ascending; axillary thorns 6–8 mm long, somewhat spreading, covered from base with scattered 1–2-jointed and stipitate capitate-glandular hairs; calyx narrowly campanulate, with slightly oblique throat, glabrous, the teeth broadly oblong, rounded at apex, 12–18 mm long and 5–6 mm broad, one-and-a-third times as long as the tube; corolla pale pink, exserted; upper lip cleft, with dense fringe of hairs at margin; lower lip 3-lobed, deeply notched, the middle lobe cut into 2 ovate lobules, the lateral lobes oblong; upper filaments mostly as long as corolla. June–July. (Plate IX, Figure 2.)

Mountains, from the grass and frob zone to subalpine zone, at altitudes between 1500 and 2800 m. — Centr. Asia: Pam.-Al., T. Sh. (W.). Described from Zeravshan. Type in Leningrad.

21. *L. usunachmaticus* Knorr. in Bot. mat. gerb. Bot. inst. AN SSSR, IX, 1–3 (1941) 59.

Perennial, 25–35 cm high, with a stout multicapital root; stems numerous, erect or slightly curved, glabrous in lower part, covered in upper part at the edges with sparse 1-jointed and capitate-glandular hairs; leaves obovate in outline, twice or three times pinnatisect, with ovate or linear obtuse or short-acuminate segments, short-petioled, glabrous, 178 punctate-glandular; bracts in the leaf axils slender, acicular, 7–12 mm long, glabrous, those under the semiverticels trigonous, acicular-pointed, 10–20 mm long, with 2–3-jointed hairs; semiverticels 5–8, approximate, 4–6-flowered; calyx tubular-campanulate, glabrous, the teeth oblong-oblong, abruptly attenuate toward base, 15–17 mm long, 4–5 mm broad (2 mm at base), terminating in a prickle 0.5 mm long; corolla yellow or creamy, about equaling the calyx or slightly exserted; upper lip densely villous at margin above, with 2 or 3 unequal teeth; lower lip with middle lobe deeply cut into two broad-ovate lobules, the lateral lobes oblong, denticulate. July–August.

Wood and scrub zone, on stony slopes. — Centr. Asia: Syr D., T. Sh. (W.). Endemic. Described from western Tien Shan. Type in Leningrad.

Series 5. *Quadridentati* Knorr. — Calyx 4-toothed, the teeth oblong, twice to three times as long as the tube; whorls 2-flowered; leaves twice or three times parted.

22. *L. paulsenii* Briq. in Bot. Tidsskrift. 28 (1908) 243. — *L. diacanthophyllus* var. *paulsenii* Knorr. in O. and B. Fedch. Perech. rast. Turk. V (1913) 169. — *L. cabulicus* var. *quadrilobus* Drob. in Tr. Bot. muz. AN, 16 (1917) 144. — Ic.: Bot. mat. gerb. Bot. inst. AN SSSR, IX, 1–3, 60. — Exs.: GRF, No. 3461.

Perennial, 30–50 cm high; stems numerous, erect or reclinate, covered under the inflorescence with short appressed 1–2-jointed hairs, with short thick glandular hairs on the sides; leaves broadly rhomboid in outline, twice or three times parted, the lanceolate and linear segments revolute-margined, obtuse or short-acuminate; lower leaves on long dilated petioles, the upper subsessile, glabrous on both sides, with short hairs on the veins, the margin also with capitate-glandular hairs; semiverticels 2-flowered; bracts thin, acute, under the semiverticels 15–17 mm long; thorns in the leaf axils shorter; calyx narrowly campanulate, 4-toothed, covered with 1–2-jointed and stipitate capitate-glandular hairs, the teeth oblong, 17–27 mm long and 3 mm broad, twice to three times as long as the tube; corolla as long as calyx or slightly exserted, pink with dark nerves; upper lip with broad-ovate lobes; lower lip 3-lobed, the middle lobe shortly emarginate, the lateral lobes linear-lanceolate. July.

179 Wood and scrub thickets, at altitudes between 2000 and 2500 m. — Centr. Asia: Pam.-Al. Endemic. Described from Shakhimardan. Type in Leningrad.

Series 6. *Platycalyces* Knorr. — Calyx with rotate limb, the teeth broadly triangular; bracts small, with bristly and articulate hairs.

23. *L. platycalyx* Schrenk ex Fisch. et Mey. in Ind. sem. hort. Petrop. IX (1843) 13; Ldb. Fl. Ross. III, 431. — *L. limbatus* M. Pop. et Lapin in Opred. rast. Tashk. I (1938) 253. — *Chlainanthus platycalyx* Briq. in Pflanzenfam. IV, 3a (1896) 257.

Perennial, 20–50 cm high; stems herbaceous, erect, simple or branched, covered with fine 1–2-jointed hairs; leaves rhomboid in outline, pinnatisect nearly to midvein, the segments lobed or dissected, ovate, oblong or linear, obtuse or rounded at apex or short-subulate, covered above with scattered patent hairs, fringed equally below, but more densely so on the veins beneath; petioles broad, winged; semiverticels 4–6-flowered; bracts 3–7 mm long, covered with fine 2–3-jointed and short thick patent hairs; calyx with a flat throat, narrowly campanulate, covered with appressed 1–2-jointed hairs; teeth short, subtriangular, sometimes confluent, 13 mm long and to 16 mm broad at base; tube 20–25 mm long; corolla pale pink, with dark nerves, as long or one-and-a-half times as long as calyx; upper lip shortly bifid, the lobes long-haired outside; lower lip notched, with broad lobes, the lateral lobes elongated, oblong. May–June.

Dry steppes in submontane belt and foothills, on gravelly and silty soils. — Centr. Asia: Syr D., T. Sh., Pam.-Al. Endemic. Described from Khantau Mountains. Type in Leningrad.

Series 7. *Macrodoni* Knorr. — Calyx-teeth broad, ovate or oval, or broadly triangular, as long as or shorter than the tube.



24. *L. macrodontus* Knorr. in Bot. mat. gerb. Bot. inst. AN SSSR, XIII (1950) 256. — Ic.: op. cit. 233, Fig. 2a–2d.

Perennial, 30–45 cm high; stems numerous, whitish, glabrous at base, covered above with short retrorse hairs; leaves ovate in outline, 4–4.5 cm long, broadly petiolate, doubly pinnate-ternate, the segments oblong, ciliolate-margined, terminating in a short spine, glabrous, 4–4.5 cm long; semiverticels 4–8-flowered; bracts horizontally spreading, coarse, lanceolate, thick-nerved at center, 9–11 mm long, densely covered with thick spreading 4–5-jointed hairs; calyx broadly campanulate, the teeth broad-ovate, 8–12 mm long and 8–9 mm broad, as long as or shorter than the tube; calyx-tube covered with thick articulate and flexuous hairs as well as capitate glandular hairs; corolla bright pink, one-and-a-half times as long as calyx; upper lip straight, deeply cut into 2 or 3 ovate lobes, hairy at margin; lower lip notched, with broad-ovate or rounded lobes, the lateral lobes oblong. July–August.

Wood and scrub belt, on stony mountain slopes. — Centr. Asia: Pam.-Al., T. Sh. Described from Alai range, from the vicinity of Irkeshtam. Type in Leningrad.

25. *L. pulcher* Knorr. in Bot. mat. gerb. inst. AN SSSR, XI (1946) 199. — Ic.: op. cit. XIII, 233.

Perennial, 15–30 cm high; stems numerous, prostrate, glabrous or covered, mainly under the inflorescence, with long hairs; leaves rhomboid in outline, on petiole 5–10 mm long, the floral sessile; lower leaves ternate, bipinnatisect, the segments short, oblong, denticulate; semiverticels 6–8-flowered; thorny bracts in the leaf axils 5–10 mm long, the floral 9–15 mm long, narrowly lance-linear, flattened, connate in 3's, covered with 2–3-jointed hairs; calyx campanulate, 12–16 mm long, sparsely hairy at base; calyx-teeth ovate, rounded at apex, one-third to two-fifths the length of the tube, 6–7 mm long, 6–8 mm broad; corolla pink, 2–2½ times as long as calyx, covered with long silky hairs; upper lip cleft to 1/3, each of the oblong-ovate lobes with 2 or 3 denticles; lower lip 3-lobed, the middle lobe notched, with 2 broad-ovate lobules, the lateral lobes oblong-ovate; filaments shorter than corolla. June–August. (Plate IX, Figure 3.)

Lower part of the wood and scrub belt, on gravelly and stony slopes. — Centr. Asia: T. Sh. Endemic. Described from Charin-Katoga River. Type in Leningrad.

26. *L. platyacanthus* Rupr. Sert. Tiansch. (1869) 68. — *L. affinis* Rupr. l. c.

Perennial, 15–25 cm high; stems covered with bristly hairs; leaves ternate, pinnatisect, the segments linear or ovate, ciliate-margined, acuminate; lower leaves rhomboid in outline, the upper rounded; all leaves petiolate, the petioles 5–17 mm broad; bracts 7–12 mm long, lanceolate, stiff, with prominent midnerve, sharply spinescent, densely covered with spreading 2–5-jointed and stipitate capitate-glandular hairs; semiverticels 4–8-flowered; calyx tomentose with 2–3-jointed, articulate-moniliform and sessile capitate-glandular hairs; calyx-teeth ovate, subtriangular toward apex, 6–7 mm long and 4–5 mm broad, as long as or shorter than the tube; corolla about twice as long as calyx; upper lip 2–3-parted, with lanceolate lobes; middle lobe of lower lip shallowly notched, with rounded lobules, the lateral lobes oblong. June–July.

Wood and scrub belt, on stony and gravelly slopes. — Centr. Asia: Pam.-Al., T. Sh. Gen. distr.: Dzu.-Kash. (Kuldja). Described from Tien Shan, Mount Dzamandaban. Type in Leningrad.

27. *L. kaschgaricus* Rupr. Sert. Tiansch. (1869) 67. — Ic.: Knorr. in Bot. mat. gerb. Bot. inst. AN SSSR, XIII, 255.

Perennial, 15–19 cm high; stems numerous, glabrous, shining, with short hairs only in upper part, divaricate, with numerous dead branches; leaves broadly rhomboid in outline, pinnatipartite, attenuate at base to a short broad petiole, glabrous, rarely with scattered hairs, the segments oblong, obtuse or terminating in a spinule 1–1.5 mm long, the margins revolute, ciliate; semiverticels 4–6-flowered; bracts thick, subulate-spinescent, reclinate, 15–23 mm long, glabrous; calyx tubular-campanulate, with deeply incised broad-ovate teeth, obliquely truncate, with spinule 1 mm long; calyx-teeth 6–8 mm long and 5 mm broad, two-fifths to one-half the length of the tube; calyx-tube sparsely hispid, more densely so in lower part; corolla twice as long as calyx, pink; galea slightly longer than lower lip, deeply notched, with 2 toothed lobes; lower lip 3-lobed, the middle lobe shortly notched, with 2 short-toothed lobes, the lateral lobes oblong, toothed at apex. July–September.

Dry gravelly slopes. — Centr. Asia: T. Sh. Endemic. Described from the vicinity of Lake Chatyr-Kul'. Type in Leningrad.

#### Genus 1277.\* *Moluccella*\*\* L.

L. Sp. pl. (1753) 587.

Calyx oblique at base, infundibular or broadly campanulate, furrowed, with 5 mucronate or spinescent lobes; corolla bilabiate, the tube included in calyx, with a ring of hairs 182 or scaly inside; upper lip erect, entire or notched, slightly concave; middle lobe of lower lip spreading, broadly obcordate, lateral lobes oblong; stamens 4, the lower longer; anthers approximate in pairs, with divergent cells; lobes of stigma subequal; nutlets trigonous, truncate at apex; leaves rounded, sinuate or toothed. Annual herbs.

The species contains two species distributed in the Mediterranean region and in Near Asia. One species occurs in the U.S.S.R.

1. *M. laevis* L. Sp. pl. (1753) 587; Benth. Lab. Gen. et sp. 639 et in DC. Prodr. XII, 513; Boiss. Fl. or. IV, 768; Briq. in Pflanzenfam. IV, 3a, 258; Shmal'g. Fl. II, 332; Grossg. Fl. Kavk. III, 307; Vizin. Rosl. URSR, 418. — *Molucca laevis* Moench, Meth. pl. (1794) 404. — Ic.: Sibth. et Sm. Fl. Gr. tab. 566.

Annual, 30–100 cm high; stems terete, glabrous, erect from base, branched in upper part; leaves rounded, slightly oblique or cordate at base, crenate, sometimes sinuate,

\* Treatment by O.E. Knorring.

\*\* Name derived from Molucca Islands.

4–6 cm long and 4.5 cm broad, glabrous on both sides, the petiole 3.5–4 cm long; flowers few; verticillasters subdistant; bracts subulate, 9–12 mm long, connate at base in 2's or 3's or partly free, horizontally spreading, glabrous; calyx broadly campanulate, glabrous, the limb oblique, reticulate-nerved, membranous, subpentagonal, the indistinct lobes produced into a short point or spine; corolla white, the tube included in calyx, ringless but with scales and folds inside the tube; upper lip erect, slightly concave, with ciliate margin; lower lip 3-lobed, the middle lobe obcordate, the lateral lobes oblong; nutlets trigonous, obtusely truncate. July.

Ruderal sites; also a weed on cultivated land. — European part: S. Ukraine; Caucasus: S. and E. Transc.; Centr. Asia: Mtn. Turkm. **Gen. distr.:** Med. (W.), Bal.-As. Min., Arm-Kurd. Described from cultivated samples. Type in London.

# Genus 1278.\* **Otostegia**\*\* Benth.

Benth. Lab. Gen. et sp. (1832–1836) 601; Kudr. Fragm. k monogr. Otostegia (1939) 9. — Chartocalyx Rgl. in Tr. Bot. sada, VI, 2 (1880) 367. — Harmsiella Briq. in Pflanzenfam. IV, 3a (1897) 291.

Flowers numerous, short-pediceled, in distant 2–6 (10 and more)-flowered verticillasters in the axils of floral leaves; calyx-tube infundibular, more or less dilated in upper part, prominently 10-nerved, with an elongated subcoriaceous bilabiate limb, the upper lip entire, triangular, the lower larger, broad, ovate or obovate or rounded, obtuse; corolla ochroleucous, shorter than calyx, with a ring of hairs inside in upper part and a bilabiate limb; upper lip shortly oblong or ovate-elongate, erect, concave, entire, densely hirsute outside; lower lip spreading, 3-fid, the middle lobe widely notched; stamens 4, ascending, approximate in pairs, the lower longer, the filaments glabrous at base; anthers 2-celled, the cells divaricate; style with 2-lobed stigma, the lobes subulate, subequal; nutlets dry, obovoid, more or less 3-angled, obtuse at apex. Shrubs or subshrubs, with spines in the leaf axils or at the base of branches or unarmed; leaves entire, crenate, crenate-dentate or sinuate-dentate.

The genus contains 21 species mostly distributed in subtropics, from Central Asia to Near Asia and East Africa, all species being associated with mountain areas.

Section 1. **Chartocalyx** (Rgl.) Kudr. — Fragm. k monogr. Otostegia (1939) 17. — Chartocalyx Rgl. in Tr. Bot. sada, VI, 2 (1880) 368, pro. gen. — Shrubs without spines in the leaf axils or at the base of young branches; leaves entire; bracts herbaceous; calyx with strongly developed upper lip.

1. Leaves orbicular or rounded-ovate; flowers relative small; calyx 1.6 cm long; corolla 1.2–1.3 cm long; upper lip of calyx shorter than lower lip . . . . . 4. **O. bucharica** B. Fedtsch.

\* Treatment by S.G. Gorshkova.

\*\* From Greek ote, bend, and stegē, cover, referring to the enlarged, coriaceous, bilabiate calyx-limb.



- + Leaves lanceolate, elliptic or ovate-oblong; flowers larger; calyx 1.8–2.1 cm long; corolla 1.3–1.8 cm long; upper lip of calyx as long as or longer than the lower . . . . . 2.
- 2. Bracts broadly elliptic or ovate, equaling or exceeding calyx-tube; upper lip of calyx longer than the lower . . . . . 3. *O. fedtschenkoana* Kudr.
- + Bracts linear-subulate or lanceolate, equaling or shorter than calyx-tube . . . . . 3.
- 3. Bracts linear-subulate, more or less recurved, the central slightly broader than the lateral, equaling the calyx-tube, rarely shorter; upper calyx lip about equaling the lower . . . . . 1. *O. olgae* (Rgl.) Korsh.
- + Bracts lanceolate, strongly recurved, elongate-rhomboid in upper part, half the length of calyx-tube; upper calyx lip longer than the lower . . . . . 2. *O. sogdiana* Kudr.

184 1. *O. olgae* (Rgl.) Korsh. in Zap. Akad. Nauk, VIII, ser. IV, No. 4 (1896) 96; O. and B. Fedch. Perech. rast. Turk. V, 163; Fedch. Rast. Turk. 680; Kudr. Fragm. k monogr. Otostegia, 19. — Chartocalyx olgae Rgl. in Tr. Bot. sada, VI, 2 (1880) 368. — Harmsiella olgae K. Schum. in Just. Jahrb. XXVIII, 1 (1902) 484. — Ic.: Korzh. op. cit., plate II, No. 3; Kudr. op. cit. Fig. 2. — Exs.: GRF, No. 1429.

Perennial; stem (15) 30–100 cm high, woody, sometimes decumbent at base, with gray bark, to 0.7 cm thick; branches erect, the annotinous herbaceous, more or less pubescent, 30–50 cm long; leaves fleshy, elliptical, 2.5–7.5 cm long, 1–2.7 cm broad, obtuse, entire, more or less pubescent beneath, subsessile or on petiole 1 mm long; floral leaves similar, smaller, 0.5–2 cm long, 0.3–1.2 cm broad; flowers numerous, sessile; verticillasters distant, of 6 or more flowers, in the leaf axils; bracts 3, subulate or subulate-setaceous, 6–7 mm long, 0.5 mm broad, about equaling calyx-tube, rarely shorter, the central broader than the lateral, sometimes narrowly lanceolate, all more or less recurved, awn-tipped, densely pubescent; calyx 1.8–2 cm long; tube cylindrical, attenuate at base, 0.6–1.1 cm long, 2–3 mm broad, covered with short hairs, with 10 riblike nerves; limb large, 2–2.5 cm in diameter, whitish-yellow, scarious, more or less pubescent outside, netted-nerved, bilabiate, the upper lip oval, rounded at apex, 0.9–1.5 cm long, 0.4–0.8 cm broad, shortly subulate-tipped, the lower lip equaling the upper or slightly shorter and broader, rounded or almost 3-lobed, with 3 nerves excurrent into short mucro, at base with point-tipped denticulations 2.5–3 mm and 2 mm broad; corolla white, 1.5–2.8 cm long, bilabiate, the tube 8 mm long, 1.5 mm broad, with a ring of hairs and a 2-lipped limb; upper lip oval or ovate, 6–7 mm long, 2 mm broad, erect or more or less curved, obtuse or sometimes emarginate, ciliate-margined, occasionally sparsely toothed, hairy outside; lower lip spreading, 3-lobed, 5–7 mm long, 6–7 mm broad, the middle lobe 4–5 mm long, 3–5 mm broad, obcordate, dilated in upper part, notched, entire or denticulate-ciliate, the lateral lobes 2.5 mm long, 1.8–2 mm broad, entire; stamens parallel, the upper shorter, the filaments slightly hairy, the anthers 2-celled, divergent, equal; style with 2-lobed stigma, the lobes subulate, equal; nutlets trigonous, attenuate at base, 4–5 mm long, 2 mm broad, greenish-gray, smooth, dull. May–June.

Low foothills, on gypsiferous strata and tertiary rock outcrops; stone-and-silt  
185 gravelly slopes and saltwort deserts. — Centr. Asia: Pam.-Al., T. Sh. Endemic. Described from Alai range, Isfaiam River, near Uch-Kurgan. Type in Leningrad.

Note. A polymorphic plant, varying particularly in the shape, size and indument of leaves and bracts, the size of calyx and the shape of its lobes, as well as the size and sometimes the color of corolla, and dimensions of the middle lobe of lower lip. Plants with narrower bracts often occur in the middle part of the distribution area (Kudryashev, op. cit. 23).

2. *O. sogdiana* Kudr. Fragm. k monogr. *Otostegia* (1939) 24. — Ic.: op. cit. Fig. 4.

Perennial, to 1 m high; stems covered with gray bark; branches sparsely pubescent; leaves elliptic-oblong, 4–4.5 (5) cm long, 2–2.2 cm broad, obtuse, green, glabrous or mostly with sparsely pubescent veins, rugose, entire, cuneate or rounded at base; floral leaves 1–2.5 cm long, 0.5–1 cm broad, heavily pubescent; flowers numerous, sessile or short-pedicel; verticillasters 6–8-flowered, in the axils of floral leaves; bracts 3, lanceolate, 0.4–0.5 cm long, 0.5–1.5 mm broad, half the length of calyx-tube, the middle bract 1.5 mm broad, broader than the lateral, all subulate at base, scarious-margined in upper part, elongate-rhomboid, short-awned, curved, densely short-villous, ciliate-margined, with convex midnerve; calyx 2 (2.3) cm long, on a pedicel 1 mm long, the tube infundibular, attenuate at base, 0.8–1 cm long, 3–4 mm broad, 10-nerved, densely pubescent especially on the nerves, the limb 2–2.5 cm in diameter, strongly elongate, white, reticulate-rugose, with light brownish nerves, glabrous or sparsely puberulent, ciliate; upper lip oblong-elliptic or elliptic, 1.2–1.8 cm long, 5–6 mm broad, slightly exceeding the lower, slightly attenuate at apex, rounded, 3-nerved, the central nerve excurrent in a point 1 mm long; lower lip suborbicular or oval, often almost 3-lobed, with 3 nerves excurrent in awns 1 mm long; lobes at the base of upper and lower lip triangular, subulate-aristate, 3 mm long; corolla white, 1.3–1.5 cm long; tube included, 7–8 mm long, 2–2.5 mm broad, with a ring of hairs inside; upper lip more or less curved, ovate, 8.5 mm long, 4 mm broad, obtuse, slightly notched, densely hairy outside, with ciliate margin; lower lip 6.5 mm long, 3-lobed, the middle lobe obcordate, 4.5 mm long, 4 mm broad, deeply notched, the lateral lobes 3–3.5 mm long, 2.5 mm broad, rounded. June.

Outcrops of gypsiferous rocks, on slopes and gully tops. — Centr. Asia: Pam.-Al. Endemic. Described from Baisun. Type in Leningrad.

186 3. *O. fedtschenkoana* Kudr. Fragm. k monogr. *Otostegia* (1939) 28. — Ic.: op. cit. Fig. 4.

Perennial; stems numerous, 50–100 cm long, with gray bark; branches sharply ribbed, the ribs whitish, glabrous or slightly pubescent, the faces green; leaves lanceolate, (2) 3–5 (6) cm long, 1–2 cm broad, entire, obtuse, green, glabrous or sparsely pubescent on lower side and on veins, rugose, cuneate at base, sessile or rarely with petiole 1 mm long; floral leaves 0.9–3 cm long, 0.4–1 cm broad; flowers numerous, sessile, in distant 6–8-flowered semiverticels; bracts 3, broadly elliptic or ovate, scarious, 0.8–1 cm long, 3–4.5 mm broad, equaling or exceeding the calyx-tube, with

distinct midnerve excurrent in a point 0.5–1 mm long, rounded at base, pubescent, ciliate-margined; calyx 2.1 cm long, pubescent, the tube dilated above, 5–6–9 mm long, 2–3 mm broad, 10-nerved, the limb 1.8–2.2 (2.8) cm in diameter, scarious, whitish, reticulate-rugose, sparsely pubescent on the nerves, ciliate; upper lip longer than the lower, erect, oblong, attenuate at apex, 1.5–1.8 (2.2) cm long, 0.6–0.7 cm broad, 3-nerved, the central nerve excurrent in a point; lower lip suborbicular, 1–1.5 cm long, 1–1.2 cm broad, 2–3-lobed, sometimes with triangular-rounded aristate awns, pubescent and ciliate; lateral lobes at the base of upper and lower lip lanceolate or triangular, 3 mm long, terminating in a mucro 1 mm long; corolla white, 1.5 cm long, the tube included, with a ring of hairs, 8–9 mm long, 1.5–2 mm broad, with 2-lipped limb; upper lip ovate, curved, obtuse, 6 mm long, 3 mm broad, rarely more or less emarginate, densely hairy outside, with ciliate margin; lower lip 7–8 mm long, 4–5 mm broad, glabrous, slightly ciliate-margined, 3-lobed, the middle lobe 4 mm long, 3.5 mm broad, obcordate, deeply notched, the lateral lobes 2–2.5 mm long, 2–2.2 mm broad, oblong. May–June.

Mountains, up to 1500 m, slopes on gravelly-stony and loess bluffs of red sandstone. — Centr. Asia: Pam.-Al. Endemic. Described from Bal'dzhuan. Type in Leningrad.

Note. A.I. Vvedenskii (Bot. mat. gerb. inst. Bot. AN UzSSR, 14, 1954, 9–10) described *O. megastegia* Vved., differing from *O. fedtschenkoana* Kudr. in having larger bracts and many-flowered whorls, and *O. grabricalyx* Vved. which is distinguishable from both *O. fedtschenkoana* and *O. sogdiana* Kudr. by complete absence of pubescence and by the shape of bracts.

4. *O. bucharica* B. Fedtsch. in Izv. Bot. sada, XV, O. and B. Fedch. Perech. rast. Turk. VI, 354; Fedch. Rast. Turk. 680; Kudr. Fragm. k monogr. Otostegia, 32. — 187 Ic.: O. and B. Fedch. op. cit. Plate II; Fedch. op. cit. Fig. 194; Kudr. op. cit. Fig. 5.

Perennial; stems numerous, 20–100 cm long, woody at base, with gray bark; branches simple, pubescent; leaves orbicular or rounded-ovate, 1.8–3 cm long, 1.4–3 cm broad, fleshy, entire, puberulent, subcordate at base, sessile; floral leaves resembling the cauline, smaller, 1–2.5 cm long, 1–2.5 cm broad; flowers sessile or on petiole ca. 2 mm long; whorls 5–8-flowered, in the axils of floral leaves; bracts 3, scarious, densely pubescent, 7–8.5 mm long, equaling or exceeding the calyx-tube, the central obovate-lanceolate or linear-lanceolate, dilated in upper part (1–2 mm broad), the lateral linear-subulate, 0.5–0.7 mm broad; calyx exceeding the corolla, 1.6 cm long, the tube cylindric, dilated in upper part, 10-nerved, 8 mm long, 2–3 mm broad, densely pubescent, the limb large, 1.7 cm in diameter, chartaceous-scarious, whitish, netted-nerved, pubescent, bilabiate; upper lip oblong or oval, 5–7 mm long, 4–5 mm broad, rounded at apex, subulate-tipped, pubescent; lower lip 8–9 mm long, 10–11 mm broad, 2-lobed, the lobes oblong-orbicular, subulate-tipped; lobes between calyx-lips triangular-subulate, 1.5 mm long, 1 mm broad; corolla white, 1.2–1.3 cm long; tube 7.5–8 mm long, included, with a ring of hairs and 2-lipped limb; upper lip oblong, slightly emarginate, 4.5 mm long, 3.5 mm broad, slightly curved; lower lip 3-lobed, spreading, 4.5 mm long, 6.5 mm broad, the middle lobe obcordate, 3 mm



long, 2.5 mm broad, notched, the lateral lobes oblong, 2.5 mm long, 1.5–2 mm broad, entire; stamens 4, the lower longer; style 1 cm long, with 2-lobed stigma, the lobes equal. August.

Limestone outcrops in mountains, at altitudes between 300 and 350 m. — Centr. Asia: Pam.-Al. Endemic. Described from Baisun. Type in Leningrad.

Genus 1279.\* **Ballota\*\*** L.

L. Sp. pl. (1753) 582. — Pseudodictamnus Adans. Fam. II (1763) 191

188 Calyx tubular in lower part, more or less infundibular above, 10-nerved; calyx-teeth 5, equal, dilated or connate at base; corolla-tube with a ring of hairs in lower part; upper lip erect, more or less concave, slightly emarginate; lower lip spreading, 3-lobed, the middle lobe much larger than the lateral, notched; stamens approximate under upper lip, the filaments parallel, ascending, the anthers divergent at an angle of 180°; lobes of stigma subequal; disk with equal lobes, angular, or lobes enlarged above into nectaries; nutlets oblong-ovoid, rounded at apex, glabrous. Perennial herbs (in USSR) or subshrubs, rarely shrubs, with dentate leaves; flowers in axillary, usually many-flowered semiverticels, with subulate or oblong bracts.

Over thirty species, belonging to four sections, distributed mainly in Mediterranean and Near Asian countries (as far as India to the east); three of four species grown in Europe and one in South Africa. The Soviet species belong to the section *Ballota* Benth. which is characterized by soft linear bracts and 5-toothed calyx.

- 1. Calyx-teeth prostrate, semiorbicular or ovate-orbicular, abruptly terminating in a short aristate point, this usually one-and-a-half times as long as the tooth (rarely shorter); calyx-tube (2½) 3–4 times as long as the teeth including point (5–6 times the length of teeth not counting the point); leaves broad-ovate, obtuse (sometimes acute), obtusely toothed . . . . . 2. **B. borealis** Schweigg.
- + Calyx-teeth subpatent (not prostrate), lanceolate or ovate, gradually attenuate to an aristate point, this shorter than to as long as the tooth; leaves usually oblong-ovate, acuminate, sharply toothed . . . . . 2.
- 2. Calyx-teeth one-third to one-half the length of the tube (rarely as long), lanceolate, terminating in an awnlike point, this as long as or slightly shorter than the tooth; leaves and stem covered with sparse or scattered short hairs . . . 1. **B. nigra** L.
- + Calyx-teeth two-sevenths to one-third (one-fourth to two-fifths) the length of the tube, ovate, more rarely lance-ovate, terminating in an awnlike point, this (one-third) to half the length of the tooth, or else the teeth gradually attenuate to a very short spinule; plants densely gray-pubescent with long hairs . . . . . 3. **B. grisea** Pojark.

\* Treatment by A.I. Poyarkova.  
\*\* Name used by Dioscorides for one of the species of this genus.

1. *B. nigra* L. Sp. pl. (1753) 582; Fl. suec. ed. 2, II, 206; Benth. in DC. Prodr. XII, 520, p. p.; M. B. Fl. taur.-cauc. II, 52; Rchb. Ic. bot. VIII, 30; Ldb. Fl. Ross. III, 1, 434 (excl. syn. 1, 2, 3, 4); Shmal'g. Fl. II, 481; Grossg. Fl. Kavk. III, 308. — *B. ruderalis* Swartz in Palmstr. Sv. Bot. VI (1809) tab. 389; Grossg. Oprod. rast. Kavk. 189 336; Barbarich in Vozn. rost. URSS, 418. — *B. nigra*  $\beta$ . *ruderalis* W. Koch, Syn. fl. Germ. ed. 2 (1844) 657; Rchb. Ic. fl. Germ. XVIII, 10; Fedch. and Fler. Fl. Evrop. Ross. 818. — *B. nigra* ssp. *ruderalis* Briq. in Pflanzenfam. IV, 3a, (1897) 259; Hegi, III. Fl. V, 4, 2400 (excl. syn. 1, 2). — Ic.: Rchb. Ic. bot. VIII, tab. 773, fig. 1039; Ic. fl. Germ. XVIII, tab. 1218, fig. III, 4–6; Fedch. and Fler., op. cit. Fig. 734; Hegi, l. c. fig. 3270 b–d. — Exs.: Fl. Pol. exs. No. 235.

Perennial, with short creeping rhizome; stem 25–100 (125) cm long, erect, mostly branched, often nearly from base, green at first, becoming reddish- or brownish-violet, rather densely covered with short retrorse simple articulate hairs; branches prostrate, mostly long, bearing inflorescences; leaves sparsely or rather densely covered with soft simple hairs, dark green or more or less suffused with purple-violet, paler beneath, green; cauline leaves (2.5) 3–8 (9) cm long and 2–6 cm broad, oblong-ovate, with truncate or shallowly cordate base, acuminate or rarely acute, the margin sharply toothed, rarely doubly or bluntly toothed; lower teeth smaller, broader, sometimes suborbicular, often bluntly toothed; floral leaves resembling the cauline, gradually smaller toward summit; petioles recurved, hairy, about two-fifths to one-half the length of blade; semiverticels mostly dense, many-flowered, short-pedicel, the lower distant, the upper often closely approximate; bracts linear-subulate, soft, one-half to two-thirds the length of calyx; calyx 6–9 (10.5) mm long, green or with brownish-violet teeth, rather densely covered on the prominent nerves with antrorse or subpatent simple hairs, tubular-infundibular, rather gradually dilated above; calyx-teeth subpatent (not prostrate), lanceolate or lance-ovate, produced into an awnlike rigid point, this slightly shorter to longer than the tooth, the teeth one-third to one-half the length of the tube, rarely as long (var. *urticifolia* Rchb. Ic. fl. Germ. XVIII (1858) 10. — *B. urticifolia* Ortman ex Rchb. Ic. bot. (1830) 30. — *B. aristata* Rchb. Fl. Germ. exc. (1830–1832) 325 — in which the leaves are long-acuminate, with large teeth); corolla pinkish-violet, rarely white, the tube slightly shorter to longer than calyx; upper lip slightly concave, densely covered outside with long hairs; lower lip large, broadly obovate, emarginate, the lateral lobes oblong-ovate; nutlets obovoid, ca. 2 mm long, black. Fl. mid-June to September; fr. (very rarely!) from August.

Ruderal habitats, enclosures, rubbish heaps, roadsides (especially near dwellings), 190 more rarely thickets, gullies, slopes of mountains and hills. — European part: Balt., U.V., U.Dnp., M.Dnp., V.-Don, Transv. (very rarely), U. Dns., Bes., Bl., Crim., L. Don; Caucasus: throughout. Gen. distr.: Scand. (S. part), Centr. and Atl. Eur., Med. (introduced), Bal. As. Min., Arm.-Kurd. (N. part), Iran. (N. E. part, introduced?). Described from Europe. Type in London.

2. *B. borealis* Schweigg. in Koenigsb. Arch. Naturw. I (1812) 214; Rchb. Ic. bot. VIII, 30. — *B. nigra* var. *borealis* Rchb. Ic. fl. Germ. XVIII, 10. — *B. nigra* ssp. *foetida* var. *borealis* Hegi, III. Fl. V, 4, 2401. — Ic.: Rchb. Ic. bot. VIII, tab. 776, fig. 1042; Ic. fl. Germ. XVIII, tab. 1218, fig. II.

Perennial, densely covered with spreading, more or less retrorse soft simple hairs, branched, the branches obliquely ascending; leaves dark green rugose above, densely covered on both sides with rather long soft hairs, ovate, obtuse, rarely acute, obtusely toothed, with cuneately or subcordate base, to 5 cm long and 4 cm broad; semiverticels on peduncle 2–4 mm long, compact, 5–15 (23)-flowered; bracts subulate, one-half to two-thirds the length of calyx; calyx with antrorse hairs on the nerves, 6–9 (10) mm long, gently dilated at apex, tubular-obconical rather than tubular-infundibular; calyx-teeth prostrate, short, semiorbicular or ovate-orbicular, obtuse, 2 mm long and 1–1.5 mm broad, abruptly terminating in an awnlike point about  $1\frac{1}{2}$ -2 ( $2\frac{1}{2}$ ) times as long as the tooth, without the awn one-sixth to one-fifth the length of calyx-tube, with awn one-fourth to one-third (two-fifths) as long; corolla pinkish-violet, the tube mostly slightly exserted, rarely equaling calyx; upper lip broad-elliptical, with obtuse crenations at apex, long-haired outside; lower lip with broadly obovate emarginate upper lobe, the lateral lobes oblong-ovate; nutlets 2 mm long, 1 mm broad, oblong-obovoid, 3-angled, black, somewhat scabrous, lustrous. Fl. July–September; fr. from mid-September.

A ruderal plant; fences, canals, roadsides, derelict land. — European part: Lad.-Ilm., Balt. **Gen. distr.:** Centr. Eur. (Poland, N. Germany). Described from Koenigsberg (now Kaliningrad). Type lost?

Note. 1) *B. borealis* Schweigg. resembles closely *B. alba* L. described from Scania in Sweden (Fl. suec. ed. 2, II, 1755, 206. — *B. foetida* auct. pl. — *B. septum* Paulet ex Pers.), it differs in having a smaller, almost obconical (not strongly and broadly infundibular) calyx; more developed calyx-teeth, with longer point (both absolutely and in relation to the tube); also more profuse and longer hairs on stem and on leaves.

2) Grossgeim (Opred. rast. Kavk. 1949, 336) and later Sosnovskii (Fl. Gruzii, VIII, 1952, 330) reported *B. foetida* Lam. for Georgia (Borzhomi district). The name *B. foetida* is invalid according to nomenclature rules, since Lamarck indicated its synonymy with *B. nigra* L. However, this name has found its way into many European floras, where it stands for a south-European species apparently identical with *B. alba* L. (which in Sweden may be of foreign origin). Following Lamarck, many other authorities identified *B. foetida* Lam. with *B. nigra* L., thus giving rise to considerable confusion as to the connotation of the Linnaean species *B. nigra* L. and *B. alba* L., a confusion that was in no way warranted by Linnaeus' own presentation. Admittedly, the short original diagnosis of *B. nigra* L. (1753), with a most general indication of distribution (Europe), makes it impossible to determine which of the two species distinguished in western Europe (mostly presented under the names *B. foetida* Lam. and *B. ruderalis* Swartz) Linnaeus had in mind. But already in 1755, in the second edition of *Flora suecica*, where Linnaeus first described *B. alba* L., he very precisely characterized both species and pointed out the difference between them. The features mentioned for *B. nigra* L. are pointed calyx-teeth, brown stems and oblong-ovate acuminate leaves; *B. alba* L. is characterized by truncate calyx with obsolescent teeth and broad cordate leaves. The Linnaean species should be interpreted in conformity with these indications, and thus *B. ruderalis* Swartz and *B. foetida* Lam. are to be regarded as synonymous with *B. nigra* L., while *B. foetida* auct. becomes a synonym of *B. alba* L.



As regards the report of *B. alba* L. for the Caucasus (evidently implied, according to current concepts, under "*B. foetida* Lam."), the author of the present treatment is unaware of any specimens from Georgia that could be identified or connected with this species. There are, however, two specimens from Dagestan which closely approach *B. alba* L. but differ in having deeply cordate rounded leaves. As these specimens were collected under conditions unlikely to allow introduction (forb steppe and shrub thickets in downstream valleys), further search in this area is very desirable with a view to elucidating the taxonomic position of this plant.

3. *B. grisea* Pojark. sp. n. in Addenda XX, 651.

Perennial, 20–80 cm high, with short creeping rhizome; stem erect, branched, rarely simple, green or purple-violet; branches mostly long, rarely short, obliquely ascending; stem and branches covered with short fine retroflexed soft simple hairs; leaves with 192 veins impressed above and prominent beneath, grayish-pubescent on both sides with appressed soft hairs, more densely on upper side, ranging in shape from oblong-ovate acuminate or broad-ovate, acute or rarely obtuse, truncate or subcordate at base, the margin with acute or obtusish, large, often unequal teeth; cauline leaves (2) 2.5–6 cm long and (1.2) 1.5–4.5 cm broad; floral and ramal leaves smaller; petioles more or less recurved, densely soft-pubescent; semiverticels on peduncle 2–4 mm long, containing from 5 (the upper) to 7–15 (rarely more) flowers, very compact, the lower distant, the upper closely approximate; calyx 7–11 mm long, sometimes violet-tinged, densely covered on the nerves with fine antrorse hairs, tubular-infundibular, rather abruptly though not strongly dilated in upper part; teeth divaricate, two-sevenths to one-third (one-fourth to one-half) the length of the tube, ovate, rarely lance-ovate, terminating in an awnlike point, this one-third to one-half as long as the tooth, or gradually attenuate toward apex and terminating in a very short mucro; corolla violet-pink, the tube as long as calyx; upper lip elongate-elliptical, long-haired outside, rather deeply notched and thus bidentate at apex; lower lip equaling the upper, the middle lobe one-and-a-half times as broad to twice as broad as long, broadly notched at apex, the lateral lobes ovate or oblong-ovate; nutlets ca. 2 mm long and 1 mm broad, obovoid, brownish-black, lustrous, with slightly rough surface. Fl. July–October; fr. from August.

Mountains, in ravines, wood openings and subalpine meadows; also in ruderal habitats near dwellings. — Caucasus: Dag., E. Transc. (the areas of Kuba, Kusary, Shemakha, Mil'skaya Steppe), Tal. Endemic. Described from E. Azerbaidzhan, from an alpine meadow above the village Anykh in Kusary district. Type in Leningrad.

Note. Beside the calyx characteristics indicated in the key, this species is also distinguishable from *B. nigra* L. by the deeply notched upper corolla lip, the more laterally expanded middle lobe of lower lip, and the denser indument of leaves and stems.

Genus 1280.\* *Metastachys*\*\* Knorr.

Knorr. Gen. n. in Addenda XX, 652

\* Treatment by O.E. Knorring.

\*\* From Greek meta, between, and the generic name *Stachys*, in view of superficial resemblance.

Calyx tubular, with 5 subulate-spiny teeth, prominently nerved; corolla lilac; upper  
193 as long as or shorter than lower lip; erect, 2-lobed; lower lip flabellate-trilobate, the  
middle lobe broadly reniform, convex at center, firmer, broadly chartaceous and irregularly  
denticulate or hairy at margin, the lateral lobes much shorter, broadly oblong  
or ovate-oblong; ring situated at expansion of tube to throat, broad, composed of  
implexed subtomentose hairs, terminating just under the division into the two lips;  
style 9 mm long, passing through the ring opening between the two upper filaments;  
lobes of stigma linear-oblong, unequal, reaching only the margin of upper anthers;  
stamens 4, didynamous, not exerted, enlarged at triangular base; anthers reniform;  
filaments densely covered with long simple fascicled hairs, and with unequal papilliform  
hairs near the base; verticillasters approximate, forming an oblong or ellipsoid spike  
at the end of stems. Perennials, with oblique rhizome and long fibrous roots; leaves  
sagittate, deeply cordate at base, with large rounded teeth, the upper side green, with  
scattered bristly hairs, the lower side gray with copious appressed inequatorial hairs.  
A monotypic genus.

1. *M. sagittata* (Rgl.) Knorr. comb. n. — *Phlomis sagittata* Rgl. in Tr. Bot. sada,  
VI (1879) 373. — *Ballota sagittata* Rgl. op. cit. IX, 2 (1886) 607.

Perennial, with oblique rhizome and long fibrous roots; stems 40–70 cm long, ob-  
tusely 4-angled, brownish-purple or fuscous, covered with short branched hairs, more  
densely so under the nodes, with numerous sheaths of dead leaves at base; radical  
leaves sagittate, deeply cordate at base, 6–8 cm long, 5.5–7.5 cm broad, coarsely  
rounded-dentate or crenate; cauline leaves 1 or 2 pairs; upper leaves smaller, shorter  
than verticillasters; upper side of leaves green, with scattered thick bristly hairs, the  
lower side gray with copious appressed inequatorial hairs; petioles of radical leaves  
dilated at base, 6–8 cm long, those of cauline leaves clasping, 2–6 cm long; floral  
leaves short-petioled, the uppermost sessile; verticillasters 10–12-flowered, 4 distant  
and 2 or 3 approximate, forming a spikelike inflorescence; bracts subulate, partly di-  
vergent, partly appressed to flowers, connate at base in 2's or 3's, 6–9 mm long,  
covered with thick 1–3-celled and monoradial hairs; calyx greenish-purple, covered  
with branched and sparse stellate hairs; corolla lilac, 15–20 mm long, the tube sub-  
194 glabrous outside nearly to throat, with branched hairs above. June.

Mid-mountain zone, in meadow-steppe plant associations. — Centr. Asia: T. Sh.

**Gen. distr.:** Dzu-Kash. Described from Ili valley, near Kuldja (Aktyube, Pilutchi).  
Type in Leningrad.

Genus 1281.\* *Stachys*\*\* L.

L. Sp. pl. (1753) 580

\* Treatment by O.E. Knorring.

\*\* A plant name used by ancient authors.

Calyx tubular-campanulate or tubular, 5-nerved, rarely 10-nerved; calyx-teeth equal or unequal, subulate-pointed, rarely obtuse; corolla-tube nearly straight, rarely curved, with an oblique ring of hairs inside, rarely ringless; upper lip of corolla concave, entire or notched with 2 teeth at apex; lower lip 3-lobed, the middle lobe larger, entire or notched, the lateral lobes shorter; stamens 4, under the upper lip, the lower longer, bent sideways; anthers 2-celled, with parallel or divergent cells; style 2-lobed at apex; nutlets 3-angled, ovoid or oblong, obtuse or obtusely rounded at apex. Annuals, biennials or subshrubs, with entire or toothed leaves; flowers numerous, in verticillasters forming a spiciform or axillary inflorescence at the ends of stems and branches.

The genus *Stachys* comprises about 200 species distributed all over the globe. Up to 52 species grow in the U.S.S.R.

**Economic importance.** There is no doubt that many *Stachys* species that are now used as popular remedies, will find application in scientific medicine. A number of species have long been used in home treatment of skin and other diseases. Many species are useful honey-plants, while some are of potential value as ornamentals. Many species contain essential and fatty oils.

- |    |   |                                  |
|----|---|----------------------------------|
| 1. | Annuals . . . . .   | 2.                               |
| +  | Perennials . . . . .  | 3.                               |
| 2. | Lower leaves oblong-ovate, cuneate at base; calyx villous and glandular-hairy; corolla ochroleucous, much longer than calyx . . . . .           | 49. <i>S. annua</i> L.           |
| +  | Lower leaves rounded-ovate, cordate at base; calyx sulcate, hirsute; corolla pink, not exserted . . . . .                                       | 50. <i>S. arvensis</i> L.        |
| 3. | Stems herbaceous . . . . .  | 4.                               |
| +  | Stems lignified, at least at base; shrubs or subshrubs . . . . .  | 41.                              |
| 4. | Densely woolly, white-tomentose plants; leaves thick . . . . .  | 5.                               |
| +  | Plants covered with articulate, bristly or crisp hairs or glabrous, grayish-green or green; leaves relatively thin . . . . .                    | 7.                               |
| 5. | Leaves oblong-ovate, cordate at base, crenate, 7–9.5 cm long, 3.5–4.5 cm broad; calyx-teeth two-fifths to half the length of the tube . . . . . | 3. <i>S. germanica</i> L.        |
| +  | Leaves oblong-linear or spatulate, attenuate at base . . . . .  | 6.                               |
| 6. | Leaves oblong-linear; calyx-teeth two-fifths the length of the tube; corolla lilac; nutlets broadly ovoid . . . . .                             | 2. <i>S. cretica</i> L.          |
| +  | Leaves oblong-linear or spatulate; calyx-teeth half the length of the tube; corolla pink; nutlets oblong . . . . .                              | 1. <i>S. lanata</i> Jacq.        |
| 7. | Leaves broad-ovate to ovate-cordate . . . . .   | 8.                               |
| +  | Leaves either narrow, oblong, attenuate rounded at base or with cordate base . . . . .  | 24.                              |
| 8. | Calyx distinctly 2-lipped . . . . .   | 9.                               |
| +  | Calyx not 2-lipped . . . . .  | 10.                              |
| 9. | Flowers sessile; corolla lips of equal length; lower floral leaves oblong-lanceolate, crenate, exceeding the whorls . . . . .                   | 10. <i>S. persica</i> Gmel. jun. |
| +  | Flowers pedicellate; upper lip of corolla much shorter than the lower; lower floral leaves ovate, entire, as long as the whorls . . . . .       | 12. <i>S. macrophylla</i> Alb.   |



10. Flowers red; leaves broad-ovate or ovate-cordate . . . . . 11.  
 + Flowers pink or purple; leaves ovate-lanceolate or oblong-cordate . . . . . 13.
11. Whorls 6—8-flowered . . . . . 12.  
 + Whorls 10—20-flowered; calyx-teeth unequal, ovate-oblong, half the length of tube; corolla red . . . . . 11. *S. alpina* L.
12. Stems simple, slightly curved; inflorescence very long; flowers red; leaves 10—12 cm long; calyx-teeth triangular-lanceolate . . . . . 19. *S. sylvatica* L.  
 + Stems strongly branched, the branches drooping; inflorescence short; corolla dark red; leaves 3—5 cm long; calyx-teeth triangular . . . . . 20. *S. trapezuntia* Boiss.
- 196 13. Flowers 13—18 mm long . . . . . 14.  
 + Flowers 8—12 mm long . . . . . 19.
14. Flowers pediceled . . . . . 15.  
 + Flowers sessile; leaves broad-ovate, shallowly cordate at base, on petiole 2.5 cm long; calyx-teeth triangular-lanceolate, as long as or slightly shorter than the tube . . . . . 4. *S. spectabilis* Choisy.
15. Calyx with slightly oblique throat . . . . . 16.  
 + Calyx with an almost straight throat, the teeth narrowly triangular; corolla pink, the tube not exserted . . . . . 9. *S. spectabiliformis* Kapeller.
16. Lower leaves ovate-lanceolate, crenate-dentate or dentate, on petiole 6—12 cm long; calyx-teeth ovate-triangular, one-half to three-fourths the length of the tube . . . . . 5. *S. terekensis* Knorr.  
 + Lower leaves oblong-cordate or oblong-ovate, rounded or cordate at base; calyx-teeth as long as the tube or the upper tooth half the length . . . . . 17.
17. Leaves ovate or oblong-ovate, abruptly narrowing or rounded at base, crenate-dentate, the upper floral lanceolate, shorter than whorls; calyx-teeth unequal, the upper tooth half the length of the tube . . . . . 6. *S. heterodonta* Zefir.  
 + Leaves 6—7 cm long and 3—4 cm broad, oblong, deeply cordate at base, with rounded teeth; upper floral leaves exceeding whorls, green above, with scattered long hairs, gray beneath with copious appressed long articulate hairs . . . . . 18.
18. Calyx-teeth lanceolate, as long as or slightly shorter than the tube; corolla-tube not exserted . . . . . 7. *S. intermedia* Ait.  
 + Calyx-teeth ovate-lanceolate, half the length of the tube; corolla-tube exserted; lower leaves broadly oblong-lanceolate, cordate at base, crenate, crisp-haired beneath . . . . . 8. *S. balansae* Boiss.
19. Leaves ovate-cordate, 5 cm long, long-toothed, subglabrous . . . . . 16. *S. tschatkalensis* Knorr.  
 + Leaves small, 2.5—4.5 cm long, densely pubescent . . . . . 20.
20. Lower leaves 4—4.5 cm long, 2—3 cm broad, on petiole 1.5—2.5 cm long, rounded-crenate, slightly pubescent above, velutinous-lanate beneath . . . . . 14. *S. pseudofloccosa* Knorr.  
 + Lower leaves 3—4 cm long, 1.5—2.5 cm broad, alveolate on both sides, covered with articulate and glandular hairs . . . . . 21.
21. Calyx glandular-pubescent, the teeth lance-triangular, half the length of the tube . . . . . 13. *S. turkestanica* (Rgl.) M. Pop.
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- + Calyx covered with long white and sparse glandular hairs, the teeth one-third to one-half the length of the tube . . . . . 22.
22. Leaves ovate, 2.5–5 cm long and 1.5–4 cm broad, cordate at base, crisp-haired beneath; corolla red . . . . . 15. *S. hissarica* Rgl.
- + Leaves ovate or oblong-elliptical, always aristate; corolla pink . . . . . 23.
23. Calyx covered with setiform and glandular hairs; calyx-teeth one-fourth the length of the tube; inflorescence 6-flowered; leaves velutinous, stoutly aristate . . . . . 18. *S. iranica* Rech. fil.
- + Calyx covered with implexed hairs, the teeth one-half to two-thirds the length of tube; leaves softly hairy on both sides, terminating in a fine bristle . . . . . 17. *S. setifera* C.A. Mey.
24. Leaves linear, lanceolate or oblong-ovate, with cordate or rounded or attenuate base; flowers only lilac or pink . . . . . 25.
- + Leaves always tapering at base; flowers yellow . . . . . 32.
25. Stems covered with long retrorse hairs; leaves oblong-lanceolate or oblong-linear, subcordate at base, 1.5–3.5 cm broad, with dense appressed hairs on both sides, the hairs multiarticulate, taeniate; calyx-teeth triangular-subulate, spreading . . . . . 21. *S. palustris* L.
- + Stems covered with setiform patent hairs; leaves covered on both sides with such hairs . . . . . 26.
26. Calyx-teeth as long as or shorter than the tube; calyx covered with long hairs . . . . . 27. *S. baicalensis* Fisch.
- + Calyx-teeth longer than the tube; calyx slightly furrowed, with down arising from under capitate hairs . . . . . 27.
27. Leaves broadly lanceolate, glabrous, with setiform hairs only on veins, crenate-serrate . . . . . 25. *S. japonica* Miq.
- + Leaves serrate, covered above with setiform hairs, glabrous beneath . . . . . 28.
28. Calyx-teeth narrowly triangular, about equaling the tube . . . . . 26. *S. chinensis* Bge.
- + Calyx-teeth lanceolate, one-third the length of the tube . . . . . 29.
29. Bracts obsolescent, caducous; calyx white-haired; leaves crenate-serrate . . . . . 22. *S. maeotica* Postr.
- + Bracts linear, twice as long as calyx; calyx covered with spreading glandular hairs . . . . . 30.
- 198 30. Stems glabrous at base, covered above with long retrorse hairs; leaves whitish above with long hairs, white-tomentose beneath . . . . . 23. *S. wolgensis* Vilensky
- + Stems glabrous or hispid, simple, branched or unbranched at summit . . . . . 31.
31. Stems few, erect, covered with articulate and setiform hairs; leaves oblong-ovate, cordate at base, crenate, velutinous; corolla pale pink. . . . . 24. *S. komarovii* Knorr.
- + Stems numerous, ascending, branched scabrous or glabrous; leaves narrowly oblong, attenuate toward base, 2–3 cm long and 5–12 mm broad, entire at base, bluntly serrate above; corolla lilac . . . . . 32. *S. iberica* M.B.
32. Flowers yellow, orange in throat . . . . . 33.
- + Flowers unicolored, yellowish or ochroleucous . . . . . 34.
33. Lower lip of corolla with red speckles; leaves oblong-lanceolate, crenate, 4–6.5 cm long, 5–10 mm broad . . . . . 28. *S. recta* L.

- + Lower lip of corolla without red speckles; leaves lanceolate, point-tipped, sharply serrate, 3—4 cm long, 3—5 mm broad . . . . . 29. *S. atherocalyx* C. Koch.
34. Stems ascending from base, 30—65 cm long; cauline leaves oblong-lanceolate, sessile, serrulate; bracts lanceolate, ciliate; calyx-teeth triangular, about as long as the tube . . . . . 30. *S. czernjaevii* Shost.
- + Stems branched nearly from base; leaves elliptical, oblong or oblong-ovate, linear or ovate-spatulate . . . . . 35.
35. Lower leaves pinnatifid, with linear segments; corolla yellowish or purple . . . . . 33. *S. angustifolia* M.B.
- + Lower leaves entire, ovate-spatulate or elliptical . . . . . 36.
36. Flowers ochroleucous . . . . . 37.
- + Flowers pink . . . . . 40.
37. Leaves ovate-spatulate, tapering toward base, 2.5—3.5 cm long, 1.5—2 cm broad, crenulate; calyx with dense appressed hairs, the teeth lanceolate, sharply spinescent, two-fifths to one-half the length of the tube . . . . . 42. *S. maritima* L.
- + Leaves elliptical or subovate, 4—4.5 cm long and ca. 1.5 cm broad . . . . . 38.
38. Calyx-teeth unequal . . . . . 31. *S. talyschensis* Kapeller.
- + Calyx-teeth equal . . . . . 39.
39. Lower leaves oblong, rounded or obliquely truncate at base, crenate, glabrous above, sparsely pubescent beneath; calyx-teeth lanceolate . . . . . 43. *S. pubescens* Ten.
- 199 . . . . . 43. *S. pubescens* Ten.
- + Lower leaves ovate, orbicular or subcordate, coarsely dentate, with scattered hairs on both sides; corolla yellow or ochroleucous . . . . . 38. *S. odontophylla* Freyn.
40. Leaves glabrous, obovate, crenate . . . . . 41. *S. pauli* Grossh.
- + Leaves elongate-spatulate, entire, silky-pubescent on both sides . . . . . 40. *S. boissieri* Kapeller.
41. Plants covered with simple, long or articulate hairs . . . . . 42.
- + Plants covered with branched or stellate hairs . . . . . 46.
42. Inflorescence of numerous approximate 4—6-flowered whorls; leaves linear-lanceolate to oblong; calyx-teeth narrowly linear, one-third to two-fifths the length of the tube; corolla bright pink . . . . . 39. *S. lavandulifolia* Vahl.
- + Inflorescence of few 2-flowered whorls . . . . . 43.
43. Leaves oblong or oblong-spatulate, entire or distantly toothed; calyx-teeth half the length of the tube . . . . . 34. *S. fruticulosa* M.B.
- + Leaves oblanceolate or elliptical, sessile; calyx-teeth as long as or slightly shorter than the tube . . . . . 44.
44. Calyx-teeth triangular-lanceolate, spinous-tipped; corolla-tube included in calyx . . . . . 36. *S. araxina* Kapeller.
- + Calyx 2-lipped, the teeth triangular, the upper ca. 1 mm long, the lower 2 mm long; calyx-tube exserted . . . . . 45.
45. Radical and lower leaves rounded-ovate or broadly elliptical, coarsely crenate-dentate, 8—10 mm long, 6—7 mm broad . . . . . 35. *S. sosnowskyi* Kapeller.
- + Cauline leaves lanceolate or elliptical, entire or remotely dentate, 8—18 mm long, 2.5 mm broad; calyx not 2-lipped . . . . . 37. *S. grossheimii* Kapeller.
46. Subshrubs with erect or reclinate branches . . . . . 47.



- + Subshrubs with ascending, curved or pendulous branches; stem and calyx covered with branched hairs . . . . . 48.
47. Cauline leaves ovate-lanceolate or oblong, stellate-pubescent on both sides; inflorescence loosely racemiform; whorls 2-flowered, very distant . . . . . 48. *S. trinervis* Aitch.
- + Leaves oblong-linear, sparsely pubescent above, densely and compactly covered with stellate hairs; inflorescence racemiform; whorls 4–5-flowered . . . . . 46. *S. turcomanica* Trautv.
- 200 48. Stems with heavy coating of tomentum; leaves thick, broadly oblong, 2–3 cm long, 1.5–1.8 cm broad, covered with branched hairs . . . . . 45. *S. stchtschegleewii* Sosn.
- + Stems slender, covered with stellate and branched hairs; leaves oblong-ovate, 2–3 cm long, 0.7–1 cm broad . . . . . 49.
49. Calyx-teeth ovate or ovate-oblong, two-fifths the length of the tube; corolla pink or purple . . . . . 44. *S. inflata* Benth.
- + Calyx-teeth lance-subulate, as long as the tube; corolla bright pink . . . . . 47. *S. fominii* Sosn.

Section 1. *Eriostachys* Benth. Lab. Gen. et sp. (1832–1836) 534. — Whorls few- or many-flowered; bracts half the length of calyx or longer.

Series 1. *Lanatae* Knorr. — Plants densely white-tomentose lanate; leaves oblong, spatulate or ovate, thick; whorls many-flowered, the upper approximate in a spikelike inflorescence.

1. *S. lanata* Jacq. Ic. pl. rar. I (1781–1786) 11, tab. 107; Benth. Lab. Gen. et sp. 535; Boiss. Fl. or. IV, 718; Shmal'g. Fl. II, 339; Grossg. Fl. Kavk. III, 311. — *Stachys byzantina* C. Koch in Linnaea, XXI (1848) 686. — *S. taurica* Zef. in Bot. Mat. gerb. Inst. AN SSSR XIV (1951) 348. — Ic.: Pallas, Fl. Ross. tab. 109; Fedch. in Fler. Fl. Evrop. Ross. 826.

Perennial, 20–60 cm high; stems simple or branched, silvery-tomentose-lanate; radical and lower cauline leaves spatulate or oblong-linear, with broad half-clasping petiole; floral leaves shorter than to equaling the whorls, the terminal shorter, bluntly crenate, tomentose-lanate; verticillasters numerous, many-flowered, approximate, only the lowermost subdistant; inflorescence a dense compact spike; bracts linear-lanceolate, 6–8 mm long, densely covered above and at margin with fine hairs; calyx tubular, lanate-pubescent, the tube 7–8 mm long, the teeth acuminate, 3–4 mm long; corolla pubescent outside, pink, the tube included in calyx; upper lip slightly exceeding the lower; middle lobe of lower lip broad-ovate, hairy at margin, the lateral lobes short, broadly oblong; filaments exerted; nutlets oblong, brown, glabrous. May–August.

Stony places. — European part: V.-Don (introduced), Bl.; Caucasus: E. and S. Transc. **Gen. distr.:** Iran., Bal.-As. Min. Described from Greece.

**Economic importance.** Ornamental.

2. *S. cretica* L. Sp. pl. (1753) 581; Boiss. Fl. or. IV, 719; Briq. in Pflanzenfam. IV (1897) 262; Grossg. Fl. Kavk. III, 311. —  **Ic.:** Sibth. et Sm. Fl. Gr. VI, tab. 558.

Perennial, 30–60 cm high; stems erect, sparingly branched, densely gray-appressed-pubescent, with long retrorse hairs; lower leaves oblong-linear, attenuate at base, 5–7 cm long and 1–1.6 cm broad, crenulate, with broad petiole; floral leaves entire, olivaceous-green, sparsely pubescent above, densely covered beneath with appressed crisp hairs, the lower oblong-lanceolate, sessile, exceeding the whorls, the upper triangular-lanceolate, as long as or shorter than the whorls; verticillasters many-flowered, the lower distant, the upper approximate; bracts linear, acuminate, long-haired; calyx tomentose-pubescent, tubular-campanulate, not beveled at throat, the triangular-lanceolate teeth two-fifths the length of the tube; corolla purple, with glabrous tube; upper lip 2-lobed, villous; lower lip 3-lobed; nutlets broadly ovaloid, alveolate-tuberculate. June-July. (Plate X, Figure 2.)

Dry steppe slopes and scrub. — European part: Crim.; Caucasus: W. and E. Transc., Tal. **Gen. distr.:** E. Med., Arm.-Kurd. Described from Greece. Type in London.

Note. *S. wassiliewii* Zefir. (in sched.), reported for the Crimea, is most probably a form of *S. cretica* Sibth.

3. *S. germanica* L. Sp. pl. (1753) 581; Benth. Lab. Gen. et sp. 536; Ldb. Fl. Ross. III, 411; Boiss. Fl. or. IV, 720; Shmal'g. Fl. II, 339; Grossg. Fl. Kavk. III, 312. — *S. polystachya* Ten. Fl. Nap. (1811) tab. 93. — *S. pisidica* Boiss. et Heldr. Diagn. ser. I, 12 (1853) 75. — Exs.: GRF, No. 3465.

Perennial, 60–120 cm high; stems erect, simple or branched at summit, white-tomentose-lanate, with long implexed hairs; radical and lower cauline leaves oblong-ovate, subcordate at base; upper leaves oblong, the uppermost floral exceeding the whorls; all leaves crenate, grayish-green above, covered with scattered long hairs, alveolate gray beneath, densely fascicled-hairy; verticillasters many-flowered, the lower distant, the upper approximate, forming a dense spike; bracts linear-lanceolate, equaling or exceeding calyx, covered with long hairs; flowers subsessile; calyx tubular-campanulate, with oblique throat, woolly-tomentose, the teeth triangular-lanceolate, the upper longer, two-fifths to one half the length of the tube; corolla light purple, the tube included in calyx; upper lip long-haired, shorter than the lower, shallowly emarginate; lower lip 3-lobed, the middle lobe broad-oval, the lateral lobes oblong; stamens included in corolla-tube. June-July.

Wood margins, forb meadows, weed-infested places and roadsides. — European part: U. Dnp., M. Dnp., Bes., Bl., Crim.; Caucasus: Cisc., Dag., W., E. and S. Transc. **Gen. distr.:** Centr. and Atl. Eur., Med. (W.). Described from W. Europe. Type in London.

Series 2. *Spectabiles* Knorr. — Grayish-green lanate plants, with articulate or crisp hairs; calyx-teeth equal or unequal; leaves ovate-lanceolate or oblong-lanceolate.

4. *S. spectabilis* Choisy ex DC. in Mém. Soc. Phys. Genève, 1 (1823) 456; Boiss. Fl. or. IV, 723; Grossg. Fl. Kavk. III, 312. — *S. hypoleuca* C. Koch in Linnaea, XXI (1848) 688. — *S. elata* C. Koch, l.c. — *S. germanica* L. var. *spectabilis* Briq. in Pflanzenfam. IV (1897) 263.

Perennial, 60–85 cm high; stems erect, simple or branched, covered with long spreading hairs, more densely under the inflorescence; lower leaves broad-ovate, subcordate, 8–18 cm long and 5–6 cm broad; upper leaves ovate-lanceolate, the uppermost lanceolate, acuminate, exceeding the whorls; all leaves serrate, sparsely appressed-hairy above, grayish beneath, densely covered with crisp hairs; lower leaves on petiole 2–2.5 cm long, the upper subsessile; flowers sessile; verticillasters many-flowered, the lower distant, the upper approximate, forming a spikelike inflorescence; bracts linear-subulate, curved, as long as or shorter than calyx, covered with long antrorse hairs; calyx-teeth unequal, triangular-lanceolate, mucronate, half the length of calyx or shorter, covered with long antrorse hairs; corolla pink or pinkish-purple; upper lip broadly oblong, emarginate, densely hairy above; lower lip 3-lobed, the middle lobe broadly reniform, the lateral lobes rounded, as long as the middle lobe; filaments included in corolla; nutlets broadly trigonous, glabrous, smooth. June–August.

Meadows in upper forest and subalpine zones. — Caucasus: Cisc., W., E. and S. Transc. **Gen. distr.:** Arm.-Kurd., Iran. Described from cultivated specimens, grown from seed in the Goren botanical garden. Type in Geneva.

203 5. *S. terekensis* Knorr. in Bot. mat. gerb. Bot. inst. AN SSSR, XV (1953) 341.

Perennial, 35–75 cm high; stems simple, slightly curved, sometimes branched in upper part, covered with scattered long hairs, more densely under the inflorescence and at nodes; radical leaves ovate-lanceolate, 10–20 cm long, 4–8 mm broad; lower cauline leaves similar, smaller; upper leaves subovate; all leaves crenate-dentate, the lower floral serrate, exceeding the whorls, the terminal entire, equaling the whorls, covered above with long appressed hairs, gray beneath, densely covered with implexed flexuous hairs; radical leaves on petiole 6–19 cm long, the lower cauline on shorter petiole, the upper subsessile; inflorescence a long spike; verticillasters many-flowered, the lower distant, the upper approximate; pedicels 3–9 mm long; bracts linear-lanceolate, as long as or shorter than calyx, long-haired; calyx with slightly oblique throat, covered with long hairs, the teeth ovate-triangular, short-acuminate, unequal, half to three-quarters the length of the tube; corolla purple, the tube scarcely exerted, glabrous, pubescent only under the throat; upper lip broad-oval, slightly shorter than to as long as the lower, undulate-margined or bidentate; lower lip 3-lobed, the middle lobe broadly reniform, the lateral lobes oval; filaments densely pubescent; nutlets broadly ovoid, obtuse at apex, glabrous. July.

Meadows in forest and subalpine zones. — Caucasus: Cisc. Endemic. Described from N. Osetia. Type in Leningrad.



6. *S. heterodonta* Zefir. in Bot. mat. gerb. Bot. inst. AN SSSR, XIV (1951) 349.

Perennial, 70–90 cm high; stems ascending at base, sparingly branched, lanate; lower leaves ovate or oblong-ovate, abruptly narrowing or rounded at base, crenate-dentate or dentate, on petiole 1–4 cm long; floral leaves sessile, ovate-lanceolate, attenuate at base, unevenly crenate-serrate, exceeding the whorls, the upper lanceolate, entire, shorter than the whorls, sparsely pubescent above, loosely tomentose beneath, the terminal subtomentose; verticillasters many-flowered, the lower distant, the upper approximate; flowers on pedicel 1 mm long; bracts slightly shorter than calyx, linear-lanceolate, villous; calyx-teeth unequal, the uppermost tooth about half the length of the tube; corolla pink, the upper lip subentire, the middle lobe of lower lip three times as broad as the lateral; nutlets broadly trigonous-ovoid, brown. July.

Wood openings. — European part: Crim. Endemic. Described from forest preserve. Type in Nikita Garden; isotype in Leningrad.

- 204 7. *S. intermedia* Ait. Hort. Kew. II (1789) 301; Briq. in Pflanzenfam. IV, 3a (1897) 263; Grossg. Fl. Kavk. III, 338. — *S. alpina* var. *intermedia* Benth. in DC. Prodr. XII (1848) 465. — *S. germanica* L. var. *intermedia* Boiss. Fl. or. IV (1879) 720; Shmal'g. Fl. II, 339. — *S. sibirica* Link, Enum. hort. Berol. II (1821–1822) 109.

Perennial, 60–100 cm high; stems branched, covered with long spreading hairs, more densely under the inflorescence; lower leaves 6–7 cm long and 3–4 cm broad, oblong, deeply cordate, with rounded teeth, petiolate; upper cauline leaves oblong-ovate, subsessile, serrate, the upper floral oblong-lanceolate, entire, exceeding the whorls; leaves green above, with scattered long hairs, grayish beneath with copious, closely appressed, long articulate hairs; inflorescence branched, the lower 1 or 2 verticillasters distant, the upper approximate, 16–20-flowered; flowers short-pedicel; bracts linear-lanceolate, 7–9 mm long, long-haired; calyx tubular-campanulate, covered with long articulate hairs, the lanceolate teeth as long as or slightly shorter than the tube; corolla pink or purple (?); upper lip oval, hairy, slightly shorter than the lower, shallowly emarginate; lower lip 3-lobed, the middle lobe broad-ovate, the lateral lobes oblong; filaments slightly exerted, pubescent; nutlets ovaloid, glabrous. June–August.

Mountain slopes, scrub and mountain meadows. — Caucasus: Cisc., Dag., S. and E. Transc. Gen. distr.: Bal.-As. Min., Iran. Described from cultivated specimens. Type in London.

8. *S. balansae* Boiss. et Ky. ex Boiss. Fl. or. IV (1879) 722; Grossg. Fl. Kavk. III, 311.

Perennial, 60–100 cm high; stems simple or branched, covered with long hairs; lower leaves broadly lanceolate (in var. *latifolia* Kusn. larger and broader); upper cauline leaves narrowly oblong-lanceolate, crenate; floral leaves entire, exceeding the whorls, the upper as long as the whorls, green above, with scattered long hairs, crisp-haired beneath; lower leaves on petiole 6–7 cm long, the upper on petiole 1.5–2 cm long, the terminal sessile; flowers pedicel; verticillasters many-flowered, the lower widely spaced, the upper approximate, forming a long spikelike inflorescence; bracts



PLATE X. 1 – *Stachys persica* Gmel. jun., plant parts, corolla, calyx, nutlet; 2 – *S. cretica* L., part of inflorescence, calyx, nutlet, corolla; 3 – *S. balansae* Boiss., upper part of inflorescence, nutlet, corolla calyx.

207 linear, equaling the calyx, covered at base with thick 4–5-jointed hairs, with finer hairs above; calyx tubular-campanulate, covered with long antrorse hairs, the teeth ovate-lanceolate, spinous-tipped, half the length of the tube; corolla pink, with glabrous tube; upper lip shallowly emarginate, as long as the lower, hairy; lower lip 3-lobed, the middle lobe broadly reniform, the lateral lobes rounded; nutlets obovoid, obtuse at apex, glabrous. June–July. (Plate X, Figure 3.)

Upper part of the forest zone and subalpine meadows. — European part: Crim.; Caucasus: Cisc., Dag., W., E. and S. Transc. Gen. distr.: Arm.-Kurd. Described from Mush. Type in Geneva; cotype in Leningrad.

9. *S. spectabiliformis* Kapeller in Zam. po sistem i geogr. rast. Tbil. bot. inst. AN GruzSSR, 16 (1951) 14.

Perennial, 60–100 cm high; stems erect, branched, rather densely pubescent below, the branches grayish with dense appressed pubescence; leaves ovate or broadly lanceolate, 7–8 cm long, 2.5–4 cm broad, green, appressed-hairy above, grayish beneath, finely tomentose as are the petioles, bluntly serrate, acute or subacute, the lower and middle subcordate, the upper rounded at base, the floral similar, smaller, the terminal broadly ovate-rhomboid, entire, rounded at apex; lower and middle leaves on petiole 15–20 mm long, the upper on shorter petiole, the floral sessile; flowers pedicellate, in many-flowered verticillasters; bracts covered with long hair, the longer lance-linear, the shorter narrowly linear, subsetaceous; calyx narrowly infundibular, with a nearly straight throat, whitish with copious long appressed silky hairs; calyx-teeth equal, narrowly triangular, mucronulate; corolla pinkish-lilac or faintly purple, covered outside with long white hairs; upper lip emarginate, rarely entire; lower lip with rounded emarginate or entire middle lobe; corolla-tube included in calyx or slightly exerted; filaments hairy in middle part; nutlets obovoid, slightly trigonous, dark brown, glabrous. July–August.

Mountain areas, banks of rivers and lakes. — Caucasus: E. Transc. Endemic. Described from Akhalkalaki district. Type in Tbilisi.

Series 3. *Persicae* Knorr. — Calyx distinctly 2-lipped or with unequal teeth; leaves ovate or ovate-oblong, cordate at base.

10. *S. persica* Gmel. jun. ex C.A.M. in Verzeichn. (1831) 94; Boiss. Fl. or. IV, 724; Grossg. Fl. Kavk. III, 310. — *S. sericea* Ldb. Fl. Ross. III (1849) 412, non Wall.

208 Perennial, 40–80 cm high; stems simple or branched, covered with appressed fine hairs; lower leaves ovate, cordate at base, 8–10 cm long and 4–6 cm broad; lower floral leaves longer, the upper shorter than the whorls, oblong-lanceolate; all leaves crenate, green above, gray beneath with copious appressed crisp hairs; lower leaves petiolate; inflorescence spikelike; verticillasters many-flowered, the lower distant; flowers sessile; bracts lanceolate, covered with long hairs, as long as or shorter than calyx; calyx long-haired, distinctly 2-lipped, the teeth triangular-lanceolate, often



reclinate, the upper three shorter, connate; corolla pink, the tube glabrous, only near the throat pubescent; upper lip ovate, long-haired; lower lip as long, 3-lobed, the middle lobe broad-ovate, undulate-margined, the lateral lobes rounded-oblong; filaments exserted, pubescent from base to apex; nutlets ovoid-trigonal. June—July. (Plate X, Figure 1.)

Forests and forest margins, in the lower and middle mountain zones. — Caucasus: Tal. Gen. distr.: Iran. Described from Talysh. Type in Leningrad.

11. *S. alpina* L. Sp. pl. (1753) 581; Benth. Lab. Gen. et sp. 537; Ldb. Fl. Ross. III, 411; Boiss. Fl. or. IV, 718. — Ic.: Rchb. Ic. fl. Germ. XVIII, 1209.

Perennial, 65–100 cm high; stems somewhat curved, villous with numerous tangled hairs, glandular-hairy under the inflorescence; cauline leaves ovate-oblong, cordate at base, the upper lanceolate, all crenate, covered on both sides with scattered multiarticulate hairs, especially on the veins; radical and lower cauline leaves on villous petiole 10–12 cm long, the middle cauline short-petioled; upper leaves sessile, twice as long as the whorls; verticillasters 10–20-flowered, the lower distant, the upper approximate, forming a spikelike inflorescence; bracts narrowly linear, as long as or shorter than calyx, covered with multiarticulate and glandular hairs; calyx-teeth unequal, ovate-oblong, spinous-tipped, half the length of the tube; corolla red, the tube included in calyx; upper lip much shorter than the lower, ovate, with undulate margin; lower lip with a broad middle lobe and short oblong lateral lobes; nutlets subglobose, glabrous. May—July.

Forests and scrub. — European part: Bes., U. Dns., M. Dnp. Gen. distr.: Centr. Eur., Bal.-As. Min. Described from Europe. Type in London.

12. *S. macrophylla* Alb. in Tr. Tifl. bot. sada, I (1895) 202; Grossg. Fl. Kavk. III, 311.

209 Perennial, 75–120 cm high; stems with short appressed branches, covered with hairs of varying length or villous; leaves large, ovate or ovate-orbicular, obtuse, cordate at base, coarsely crenate-dentate, the cauline oblong-ovate, the lower floral ovate or ovate-lanceolate, entire, equaling the whorls, the upper shorter, appressed-hairy on both sides, the lower long-petioled, the upper short-petioled or sessile; flowers short-pedicled; verticillasters 10–12-flowered, the lower distant, the upper approximate; bracts lanceolate or linear-lanceolate, as long as or shorter than calyx, covered with long hairs; calyx tubular-campanulate, covered with long hairs; teeth triangular-lanceolate, short-acuminate, unequal, half the length of the tube, the upper three connate; calyx-tube prominently nerved; corolla pink, villous above, one-and-a-half times as long as calyx; upper lip much shorter than the lower, broad-ovate, flat, emarginate; lower lip 3-lobed, the middle lobe broadly reniform, notched, the lateral lobes rounded; corolla-tube glabrous, scarcely exserted; filaments pubescent in middle part, exserted. May—June.

Meadows in forest and subalpine belts. — Caucasus: W. Transc. Endemic. Described from Abkhazia; cotype in Leningrad.

Series 4. *Hissaricae* Knorr. — Upper lip of corolla two-thirds the length of the lower; leaves 3–5 cm long, 1.5–4 cm broad, ovate or oblong-ovate or ovate-cordate; flowers small; corolla red or lilac. Central Asian species.

13. *S. turkestanica* (Rgl.) M. Pop. comb. n. — *S. alpina* L. var. *turkestanica* Rgl. in Tr. Bot. sada, VII (1879) 80.

Perennial, 50–100 cm high; stems somewhat curved, branched at summit, covered with scattered 1–2-jointed hairs, more densely covered under the inflorescence with glandular and articulate hairs; leaves ovate, with rounded teeth; cauline leaves subcordate at base, 3–4 cm long, 1.5–2.5 cm broad, the floral ovate-lanceolate; all leaves alveolate on both sides, covered with 1–2-jointed and glandular hairs; lower leaves on petiole 3–3.5 cm long, the upper sessile; flowers sessile; verticillasters 8–12-flowered, the lower distant, the upper approximate; bracts linear, as long as or shorter than calyx, covered with 1–2-jointed hairs; calyx tubular-campanulate, glandular-pubescent, the teeth lanceolate, spinous-tipped, half the length of the tube; corolla-tube slightly exerted or included in calyx; upper lip shorter than the lower, narrowly oblong, somewhat pointed at apex, rarely short-bidentate, hairy; lower lip with broadly oblong-  
210 ovate middle lobe and oblong-orbicular lateral lobes; nutlets broadly obovoid, glabrous, smooth or finely alveolate. July–September. (Plate XI, Figure 3.)

From upper timber line to alpine belt, on stony screes. — Centr. Asia: T. Sh. (W.), Pam.-Al. Endemic. Described from Tashkent Alatau.

14. *S. pseudofloccosa* Knorr. in Addenda XX, 653.

Perennial, 60–70 cm high; stems erect from base or slightly curved, branched above, covered with implexed woolly hairs, retrorse-hairy in inflorescence; leaves with recurved hairs; lower and middle cauline leaves ovate, rounded-crenate, 4–4.5 cm long and 2–3 cm broad; upper floral leaves similar, smaller, sessile; terminal leaves ovate-lanceolate, 8–10 mm long, 3–4 mm broad; all leaves deeply alveolate beneath, velutinous-lanate, with hairs on convexities, grayish above with scattered hairs; lower leaves on petiole 1.5–2.5 cm long; floral leaves sessile; inflorescence long; verticillasters 8–12-flowered, the lower distant, the upper approximate; bracts lanceolate, one-half to two-thirds the length of calyx, covered with long fine hairs; calyx campanulate, with indument as on bracts, the teeth lanceolate, 3–3.5 mm long, 2–3 mm broad at base, with mucro 1–1.5 mm long, half the length of the tube; corolla pinkish-lilac, the tube included in calyx, glabrous from base to middle, with scattered hairs above up to the throat; upper lip half the length of the lower, hairy above; middle lobe of lower lip broadly obovate, the lateral lobes oblong, half the length of the middle lobe; nutlets trigonous, glabrous. June–July.

Wood and scrub belt, on gravelly southern slopes. — Centr. Asia: Pam.-Al. Endemic. Described from the Turkestan range. Type in Leningrad.

15. *S. hissarica* Rgl. in Tr. Bot. sada, IX, 2 (1886) 614; O. and B. Fedch. Perech. rast. Turk. V, 164.

Perennial, 35–56 cm high; stems somewhat curved, branched, tomentose-lanate; cauline leaves ovate, cordate at base, 2.5–5 cm long and 1.5–4 cm broad, orbiculate; lower floral leaves oblong-ovate, equaling the whorls, the upper similar, smaller, shorter than the whorls; all leaves with blunt rounded teeth, velutinous above with copious appressed hairs, grayish-green beneath, with crisp hairs; lower leaves on pubescent petiole 2–3 cm long; cauline leaves on petiole 1.5–2 cm long, the upper sessile; ver-  
211 ticillasters many-flowered, the lower widely spaced, the upper approximate; flowers sessile; bracts subulate-linear, spinescent, as long as or slightly shorter than calyx-tube; calyx tubular-campanulate, covered with long 3–5-jointed white and sparse glandular hairs; the teeth triangular-lanceolate, acuminate, one-third to one-half the length of the tube; corolla red, exserted; upper lip nearly twice as long as the lower, entire, oblong, long-haired; lower lip 3-lobed, the middle lobe broad-ovate, emarginate, undulate, the lateral lobes ovate; filaments pubescent at base; nutlets obovoid, obtuse at apex, glabrous, alveolate. August. (Plate XI, Figure 2.)

Mountain areas, in stony places. — Centr. Asia: Pam.-Al. Endemic. Described from Zeravshan range, Zigdy area. Type in Leningrad.

16. *S. tschatkalensis* Knorr. in Bot. mat. gerb. Bot. inst. AN SSSR, XV (1953) 344. — Ic.: op. cit. 345.

Perennial, 70–75 cm high; stems erect, 4-angled, furrowed, brownish-green, branched above, sparsely covered with long hairs, more densely under the inflorescence; basal and cauline leaves ovate-cordate, equaling the whorls, sparsely covered above with articulate and very few glandular hairs, glabrous beneath or with scattered pubescence, more densely hairy on the prominent veins; inflorescence long; verticillasters few-flowered, widely spaced, the upper approximate; flowers sessile; bracts linear-lanceolate, as long as or shorter than calyx, covered with long articulate hairs; calyx tubular-campanulate, with articulate-hairs, the teeth equal, lanceolate, spinous-tipped; corolla pale pink, pubescent outside, the tube glabrous; upper lip ovate; lower lip with broadly reniform middle lobe and oblong-ovate lateral lobes; filaments exserted, densely pubescent; nutlets obovoid, furrowed. May.

Stony slopes in the forest-steppe belt. — Centr. Asia: T. Sh. (W.). Endemic. Described from the Koksuz river canyon. Type in Leningrad.

Series 5. *Setiferae* Knorr. — Stems branched nearly from base; leaves oblong-ovate or elliptical-lanceolate, always setiferous at apex; bracts lanceolate or subulate; corolla pink.

17. *S. setifera* C. A. M. Verzeichn. (1831) 94; Ldb. Fl. Ross. III, 412; Boiss. Fl. or. IV, 724; Briq. in Pflanzenfam. IV, 3a, 262; Grossg. Fl. Kavk. III, 310. — *S. ly-*  
212 *copsiformis* C. Koch in Linnaea, XXI (1848) 651.

Perennial, 30–60 cm high; stems flexuous, branched, thinly pubescent; cauline leaves oblong-ovate, distantly dentate; floral leaves ovate; all leaves setiferous at apex,





PLATE XI. 1 — *Stachys setifera* C. A. M., part of stem, upper part of inflorescence, calyx, corolla, nutlet; 2 — *S. hissarica* Rgl., upper part of inflorescence, calyx, corolla, nutlet. 3 — *S. turkestanica* (Rgl.) M. Pop., part of inflorescence, corolla, calyx, nutlet.

softly hairy on both sides; inflorescence long; verticillasters 8–10-flowered, the lower distant, the upper approximate; bracts lanceolate, as long as or shorter than calyx; calyx densely covered with implexed hairs, the teeth triangular, terminating in a spinule 1 mm long, one-half to two-thirds the length of the tube; corolla pale pink, puberulent, the tube included in calyx; upper lip shorter than the lower, emarginate; lower lip with broadly obovate undulate-margined middle lobe and short ovate lateral lobes; filaments exserted; nutlets trigonous, glabrous. July. (Plate XI, Figure 1.)

Mountain areas, in wet meadows. — Caucasus: W., E. and S. Transc.; Centr. Asia: T. Sh. (W.), Pam.-Al. Described from Talysh. Type in Leningrad.

Note. It is possible to distinguish var. *rosea* Knorr. in Transcaucasia. It has calyx-teeth slightly shorter than the tube; the leaves are obtuse with a short seta or acuminate.

18. *S. iranica* Rech. fil. in Oesterr. Bot. Zeitschr. 99 (1952) 44.

Perennial; rhizome creeping, with spreading underground shoots; roots filiform; stems erect or ascending, 4-angled, simple or sparingly branched in upper part, glabrous below, covered above with crisp, spreading and glandular hairs; lower cauline leaves shed at flowering time; middle leaves short-petioled, oblong-elliptical to elliptical-lanceolate, 5 cm long and 2 cm broad, rounded at apex, terminating in a thick firm seta, with indistinct wide teeth, velutinous-pubescent, on the veins beneath also with longer hairs; upper leaves smaller, short-petioled; floral leaves oblong or elliptical-ovate, mostly spreading, the lower three times the length of whorls, the upper equaling the whorls, mucronate; inflorescence long; verticillasters mostly 6-flowered; bracts short, subulate-pointed; calyx regularly infundibular or slightly oblique, covered with seti-  
215 form and glandular hairs, the teeth one-fourth the length of the tube, triangular, equal; corolla one-and-a-half times as long as calyx, pink.

Mountain areas, in wet meadows, at altitudes between 1200 and 2200 m. — Centr. Asia: Mtn. Turkm. Gen. distr.: Iran. Described from Ashkhabad-Sulyuklyu district, from plants collected by Sintenis. Type in Vienna; cotype in Leningrad.

Section 2. *Stachyotypus* Benth. Lab. Gen. et sp. (1832-1836) 541. — Verticillasters mostly few-flowered; bracts very short or absent.

Series 1. *Silvaticae* Knorr. — Stems herbaceous; leaves ovate-cordate; bracts setaceous, often obsolescent; corolla red.

19. *S. sylvatica* L. Sp. pl. (1753) 580; Benth. Lab. Gen. et sp. 541 et in DC. Prodr. XII, 469; Ldb. Fl. Ross. III, 413; Boiss. Fl. or. IV, 726; Hook. Fl. Brit. Ind. IV, 676; Briq. in Pflanzenfam. IV, 3a, 263; Shmal'g. Fl. II, 340; Fedch. and Fler. Fl. Evrop. Ross. 821; Fl. Yugo-Vost. VI, 160; Kryl. Fl. Zap. Sib. IX, 2366. — Ic.: Fedch. and Fler. op. cit.; Fl. Yugo-Vost. VI, Fig. 613. — Exs.: GRF, No. 333.

Perennial, 30–120 cm high; stems erect or slightly curved, branched at summit, covered at base with scattered long hairs, more densely so under the inflorescence; leaves 10–12 cm long and 6.5–7.5 cm broad, ovate-cordate, acuminate, coarsely crenate-serrate, thin; lower floral leaves oblong-ovate, the upper oblong-lanceolate, entire, exceeding the whorls, light green, appressed-hairy above, grayish-green, with scattered fine hairs beneath, more densely hairy on veins; inflorescence long; verticillasters 6–8-flowered, the lower distant, the upper approximate; flowers pedicellate; bracts linear-setaceous, inserted at base of pedicels; calyx tubular-campanulate, covered with long spreading hairs, the teeth equal, narrowly triangular-lanceolate, spinous-tipped, half the length to length of the tube; corolla red, one-and-a-half times as long as calyx, the tube pubescent; upper lip shorter than the lower, ovate, entire; lower lip with broad-ovate or reniform middle lobe and short rounded-ovate lateral lobes; filaments pubescent from base to middle, exerted; nutlets dark brown, glabrous, broadly ovoid, obtuse at apex. June–August.

Shaded forests, scrub and tall-grass meadows. — European part: Kar.-Lap., Lad.-Ilm., V.-Kama, U. Dnp., U. Dns., V.-Don, Transv., Bes., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., W., E. and S. Transc.; W. Siberia: Ob, U. Tob., Irt., Alt.; Centr. Asia: Dzu.-Tarb., T. Sh. **Gen. distr.:** Centr. Eur., As. Min., Dzu.-Kash. Described from Europe. Type in London.

20. *S. trapezuntea* Boiss. Diagn. ser. II, 4 (1859) 38; Grossg. Fl. Kavk. III, 314. — *S. sylvatica* auct. non L.: Boiss. Fl. or. IV (1879) 726.

Perennial, 50–60 cm high; stems branched, sparsely pubescent, with drooping or decumbent branches; leaves cordate at base, broad-ovate, acuminate, 3–5 cm long; inflorescence short; verticillasters few-flowered; calyx-teeth triangular, subulate-pointed, as long as the tube; corolla dark red, exceeding the calyx. May–July.

Coastal woods and wood margins, coppices. — Caucasus: W. Transc. **Gen. distr.:** Arm.-Kurd. Described from the vicinity of Trapesund. Type in Geneva, cotype in Leningrad.

Series 2. *Palustres* Knorr. — Upper lip of calyx shorter than the lower; corolla mostly lilac or pink, one-and-a-half times as long as calyx; leaves lanceolate or oblong-lanceolate.

21. *S. palustris* L. Sp. pl. (1753) 580; Bge. in Ldb. Fl. alt. II, 408; Ldb. Fl. Ross. III, 414; Benth. Lab. Gen. et sp. 542 et in DC. Prodr. XII, 470; Boiss. Fl. or. IV, 726; Hook. Fl. Brit. Ind. IV, 647; Shmal'g. Fl. 341; Briq. in Pflanzenfam. IV, 3a, 263; Grossg. Fl. Kavk. III, 314; Fl. Yugo-Vost. VI, 163; Kryl. Fl. Zap. Sib. IX, 2364. — Ic.: Fl. Yugo-Vost. VI, Plate 614. — Exs.: GRF, No. 75.

Perennial, 60–110 cm high, the creeping rhizome with a tuberos swelling at the end; stems simple, rarely branched, densely covered with long retrorse hairs, rough; lower leaves lanceolate or oblong, acute, rounded or shallowly cordate at base, serrulate-dentate, 8–12 cm long and 1.5–3.5 cm broad; upper floral leaves ovate-lanceolate, entire, long-acuminate, shorter than whorls, with appressed-hairs on both sides, more



densely beneath especially on the veins; lower leaves short-petioled, the upper amplexicaul; inflorescence spikelike; verticillasters 6–10-flowered, the lower distant, the upper approximate; bracts linear, often deciduous, equaling or exceeding the pedicels; calyx distinctly 2-lipped, covered with patent glandular hairs, the teeth triangular, subulate-spinescent, as long as or shorter than the tube, spreading, unequal; corolla purple or purplish-lilac, twice as long as calyx, the tube glabrous, pubescent under the throat; upper lip much shorter than the lower, broad-ovate to orbicular; lower lip with reniform middle lobe and short rounded-ovate lateral lobes; filaments pubescent; nutlets glabrous. July–September.

- 217 Moist meadows, birch groves, wood margins, banks of rivers and lakes. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bes., U. Dns., Crim., L. Don, L. V.; Caucasus: Cisc., E. and S. Transc.; W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Yenisei, Ang.-Say.; Centr. Asia: Ar.-Casp., Balkh. Dzu.-Tarb., Syr D., T. Sh. **Gen. distr.:** Scand., Centr. and Atl. Eur., Med. (W. and E.). Bal.-As. Min., Iran, Ind.-Him., Dzu.-Kash., Mong., China (N.), Japan. Described from W. Europe. Type in London.

Note. A highly polymorphic species, in need of thorough and critical examination. Attempts to distinguish varieties and forms of this species have been made by various authorities. The following may be accepted:

var. *subcanescens* Ldb. l. c. 414. — Stem, leaves and inflorescence very densely hairy; leaves whitish-gray.

var. *viridifolia* Ldb. l. c. 414. — Stem less hairy; hairs shorter, inconspicuous; leaves green, with very sparse short hairs (on lower side confined to veins); lower whorls often very widely spaced.

var. *agrestis* (F. Aresch.) Serg. in Kryl. Fl. Zap. Sib. IX (1937) 2365. — *S. palustris* f. *agrestis* F. Aresch. ex Pl. Finl. exs. No. 341. — Stem 20–35 cm long, branched from base, short-haired; leaves green, puberulent; inflorescence contracted; calyx and floral leaves glandular.

22. *S. maeotica* Postr. in Ukr. bot. zhurn. VII, 2 (1950) 63. — **Ic.:** op. cit. 66.

Perennial, 20–66 cm high, glabrous, the rhizome with fusiform swelling at the end; leaves green, rounded or cuneate at base, crenate-serrate; petioles narrowly winged, often secund; upper leaves sessile or short-petioled, smaller, slightly exceeding the whorls, with scattered hairs on both sides; inflorescence short; verticillasters 5–8-flowered, the upper approximate; flowers short-pedicelated; bracts small; calyx covered with simple white hairs, distinctly nerved, the teeth lanceolate, two-thirds the length of the tube, spinescent; corolla dark violet, one-and-a-half times as long as calyx. July–September.

Coastal sands. — European part: Bl. Endemic. Described from the Azov coast. Type in Kiev.

23. *S. wolgensis* Vilensky, Sb. otkh. i mater. Gosplana, I (1926) 38; Fl. Yugo-vost. VI, 162. — **Ic.:** Vilenskii, op. cit. 39.

Perennial, 60–80 cm high; stems erect, simple or branched, glabrous at base, covered  
218 above with long retrorse woolly hairs; leaves short-petioled, lanceolate or ovate-lanceolate,

subcordate at base, crenulate, whitish above with long woolly appressed hairs, white-tomentose beneath; floral leaves ovate-lanceolate, entire or distantly dentate; inflorescence short; verticillasters 6-flowered; flowers short-pedicelated; bracts linear; corolla 11–12 mm long, pale-violet, one-and-a-half times as long as calyx; upper lip orbicular, shorter than the lower; lower lip with broad-reniform middle lobe and ovate lateral lobes; both lips lanate outside; filaments glandular-hairy in middle part.

Floodplains and meadows. European part: L. V. Endemic. Described from the floodplains of Bol'shoi Irgiz. Type unknown.

24. *S. komarovii* Knorr. in Bot. mat. gerb. Bot. inst. AN SSSR, XV (1953) 343. — *S. oblongifolia* Kom. ex Kom. and Alis. Opred. rast. Dal'nevost. kr. II (1932) 64, non Benth.

Perennial, 40–70 cm high; stems ascending to erect, often branched above, rough, covered with short bristly and long articulate hairs, with simple hairs under the inflorescence; leaves oblong-ovate, cordate at base, obtusely rounded at apex; cauline leaves 6–6.5 cm long and 3–3.5 cm broad, crenate or denticulate; floral leaves similar, smaller, about equaling the whorls, the uppermost much shorter, velutinous, green above, with scattered short hairs, covered beneath on the veins with short fine appressed hairs; lower leaves short-petioled; upper cauline leaves sessile; flowers pedicelated; verticillasters 6–8-flowered, the lower subdistant, the upper approximate, forming a spikelike inflorescence; bracts setaceous, soon deciduous; calyx tubular-campanulate, covered with short and long bristly hairs, thin-nerved, the teeth triangular-lanceolate, as long as or shorter than the tube; corolla pale pink; upper lip shorter than the lower, oblong, sparsely pubescent above; lower lip with broadly reniform middle lobe and rounded lateral lobes; corolla-tube pubescent at base; nutlets broadly suborbicular, dark brown, finely alveolate, glabrous. June–July. (Plate XII, Figure 3.)

Wet meadows. — Far East: Uss. Endemic? Described from Khanka area. Type in Leningrad.

25. *S. japonica* Miq. in Ann. Mus. Bot. Lugd.-Bat. II (1865–1867) 111. — *S. aspera* Michx. var. *japonica* Maxim. in Bull. Soc. Nat. Mosc. LIV (1879) 45. — *S. baicalensis* Fisch. var. *japonica* Kom. Fl. Man'chzh. III (1907) 371.

219 Perennial; stems erect, glabrous, woolly at nodes; lower leaves long-petioled, the upper sessile, broadly lanceolate, acuminate, rounded or subcordate at base, crenate-serrate; floral leaves narrowly lanceolate, serrulate, equaling the nodes, the floral shorter; all leaves glabrous except for bristly hairs on veins; verticillasters 6–8-flowered, the lower distant, the upper approximate; calyx tubular-campanulate, finely sulcate, puberulent, the teeth broadly lanceolate, subulate-pointed, longer than the tube, unequal, the uppermost tooth longer than others; corolla pink, exerted; upper lip shorter than the lower, obovate, crenulate or undulate above, hairy; lower lip with rounded-obovate middle lobe and shorter lateral lobes; filaments included in calyx-tube. May.

Forests. — Far East: Ze.-Bu. Gen. distr.: China (Manchuria), Japan. Described from Japan. Type in Holland.

26. *S. chinensis* Bge. ex Benth. Lab. Gen. et sp. (1832–1836) 544 et in DC. Prodr. XII, 471; Maxim Prim. Fl. Amur. 220; Kom. and Alis. Opred. rast. Dal'nevost. kr. 904. — *S. aspera* var. *chinensis* Maxim. in Bull. Soc. Nat. Mosc. LIV (1879) 45. — *S. baicalensis* var. *chinensis* Kom. Fl. Man'chzh. III (1907) 371. — Exs.: Gerb. Fl. SSSR, No. 3464.

Perennial, 80–100 cm high; stems erect, simple, glabrous or with setiform retrorse hairs on the ribs; leaves oblong-lanceolate, serrate, short-petioled, with scattered setiform hairs above, subglabrous beneath; inflorescence spikelike; verticillasters few-flowered, the lower distant, the upper approximate; bracts lanceolate, with ciliate margin; calyx campanulate, prominently nerved, with sparse setiform hairs on the nerves; corolla one-and-a-half times as long as calyx, pink or purple, with glabrous tube; upper lip ovate-oblong, slightly shorter than the lower, with sparse setiform teeth at apex; lower lip with broadly reniform middle lobe and very short rounded lateral lobes; filaments exerted; nutlets subglobose, brown, finely alveolate. July.

Shores of lakes and rivers. — Far East: Uss. **Gen. distr.:** China. Described from China. Type in Leningrad.

27. *S. baicalensis* Fisch. ex Benth. Lab. Gen. et sp. (1832–1836) 543 et in DC. Prodr. XII, 470; Kom. Fl. Man'chzh. III, 369; Kom. and Alis. Opred. rast. Dal'nevost. kr. II, 904. — *S. palustris* var. *baicalensis* Turcz. in Bull. Soc. Nat. Mosc. X, 6 (1837) 156. — *S. aspera* var. *baicalensis* Maxim. in Bull. Soc. Nat. Mosc. LIV 220 (1879) 45. — *S. palustris* var. *hispidula* Rgl. in Mém. Acad. Sc. Petersb. IV (1862) 119. — *S. japonica* Miq. var. *villosa* Kudo in Journ. Coll. Sc. univ. Tokio, XLIII (1921) 32. — *S. rigens* Oettingen in Tr. Yur'evsk. bot. sada, VI (1906) 216. — Ic.: Sugawara, III. Fl. of Saghal. IV, 1598; Tr. Yur'evsk. bot. sada, VI, Plate 3.

Perennial, with creeping rhizome; stems simple or with axillary branches, densely covered to summit with long setiform spreading hairs; leaves ovate-oblong, short-petioled, serrulate, green, rounded at base, sparsely or copiously covered on both sides with setiform hairs; lower verticillasters distant, the upper approximate; bracts linear-subulate or lanceolate, soon deciduous; calyx broadly campanulate, long-haired, the teeth as long as or shorter than the tube, lanceolate, terminating in a point 1–1.5 mm long; corolla pinkish-lilac, with glabrous tube; upper lip shorter than the lower, oblong, rounded at apex, pubescent; lower lip with broadly rounded middle lobe and short oblong rounded lateral lobes; filaments and style exerted; nutlets broadly subglobose, obtuse at apex, black. June–August. (Plate XII, Figure 1.)

Boggy and wet meadows. — E. Siberia: throughout; Far East: Ze.-Bu., Uda, Sakh., Kamch. Described from Kun'tuk in Dauria. Type in Leningrad.

**Economic importance.** *S. baicalensis* is used at present in treatment of hypertension.

Series 3. *Rectae* Knorr. — Stems erect, branched; bracts inconspicuous; leaves attenuate at base, narrow, lanceolate, oblong-lanceolate or linear-lanceolate; corolla large, yellow, ochroleucous or more rarely pink or purple.



28. *S. recta* L. Mant. pl. (1767) 82; Benth. Lab. Gen. et sp. 556 et in DC. Prodr. XII, 484; Boiss. Fl. or. IV, 729; Shmal'g. Fl. II, 341; Briq. in Pflanzenfam. IV, 3a, 264; Fl. Yugo-Vost. VI, 162. — *S. sideritis* Vill. Fl. Dauph. 2 (1787) 375. — Ic.: Syreishch. Fl. Mosk. gub. III, 104. — Exs.: GRF, No. 684.

221 Perennial, 30–100 cm high; stems simple or branched, hirsute; lower leaves oblong-lanceolate, crenate-serrate; upper leaves narrowly lanceolate, exceeding the whorls, the uppermost ovate-lanceolate, equaling the whorls; lower leaves short-petioled, the upper sessile, covered on both sides with appressed 2–3-jointed hairs; inflorescence long, spikelike; verticillasters 4–10-flowered, the lower distant, the upper approximate; flowers pedicellate; bracts obsolescent, setaceous; calyx campanulate, covered with 2–3-jointed antrorse hairs, the teeth triangular, aristate, half the length of the tube; corolla yellow, orange at throat, with red speckles on lower lip; upper lip bifid, shorter than the lower; lower lip with broad-ovate middle lobe and short lateral lobes; nutlets ovoid-globose, brown, punctate. May–August.

Steppe and stony slopes. — European part: U. V., V.-Kama, U. Dnp., U. Dns., Transv., Bl., Crim., L. V.; Caucasus: Cisc. **Gen. distr.:** Bal.-As. Min. Described from S. Europe. Type in London.

Note. A species *S. krynkensis* Kotov. is reported in “Viznachnik roslin URSS” (p. 419). It is pointed out that it resembles *S. recta* and should be subjected to further study.

29. *S. atherocalyx* C. Koch in Linnaea, XXI (1848) 691; Grossg. Fl. Kavk. III, 315. — *S. sideritioides* C. Koch, l. c. 692. — *S. recta* γ. *sideritioides* Boiss. Fl. or. IV (1879) 730.

Perennial, 30–60 cm high; stems numerous, simple or branched, rough with scattered short hairs; lower leaves lanceolate, acuminate, sharply serrate; lower floral leaves exceeding the whorls, covered on both sides with scattered simple hairs, the lower petiolate, the upper sessile; verticillasters 8–10-flowered, the lower distant, the upper approximate; bracts linear-setiform; calyx campanulate, long-haired, the teeth triangular, acuminate, with point 1.5 mm long; corolla yellow, orange at throat, the tube subglabrous above; upper lip broad-ovate, slightly shorter than the lower; lower lip with broad-ovate emarginate middle lobe and shorter oblong-ovate lobes; filaments exerted. May–July. (Plate XII, Figure 2.)

Dry slopes, scrub. — Caucasus: Cisc., Dag., W., E. and S. Transc., Tal. **Gen. distr.:** Arm.-Kurd. Described from Chorokh. Type in Berlin.

30. *S. czernjaevii* Shost. in Bot. mat. gerb. Bot. inst. AN SSSR, VIII, 9 (1940) 152; Vizn. rosl. URSS, 419.

Perennial, 30–65 cm high, ascending from base, glabrous or biseriate-haired; cauline leaves oblong-lanceolate, sessile, acuminate, serrulate, appressed hirsute, rarely glabrous; floral leaves ovate, shortly aristate, glabrous, with ciliate margin, exceeding the pedicels; calyx tubular-campanulate, glabrous or covered above with short hairs, the teeth triangular, nearly as long as the tube, short-acuminate; corolla yellowish, the tube exerted; nutlets obovoid, dark brown, glabrous. July.

European part: U. Don. Described from Akhtyrka. Endemic. Type in Kiev.

222 31. *S. talyschensis* Kapeller in Zam. po sist. i geogr. rast. Tbil. bot. inst. AN GruzSSR, 15 (1949) 48. — Ic.: op. cit. 51.

Perennial; stems 20–25 cm long, slightly ascending, branched nearly from base, the stem and branches covered with short, slightly curved retrorse hairs, more densely under inflorescence; cauline leaves elliptical or subovate, 4–4.5 cm long and ca. 1.5 cm broad, coarsely serrate, acuminate; lower leaves on slender petiole the length of blade, the middle on shorter petiole, the upper sessile; leaves with pubescent veins on both sides and with scattered yellow sessile lustrous glands; uppermost leaves recurved, ovate or elongate-ovate, sessile, entire, acute, glabrous or subglabrous above, more or less densely hairy beneath, with sessile yellow glands on both sides, long-ciliate in lower part; verticillasters 4–6-flowered, the upper approximate in a short dense raceme, the lower distant; flowers short-pedicelated; bracts 1–2 mm long, setiform or subulate, hairy; calyx campanulate, the 3 upper teeth distant from the lower pair; calyx with yellow glands, villous with articulate hairs, the teeth narrowly triangular, terminating in a long naked point, slightly shorter than the tube; corolla pale yellow, large, densely long-haired outside except the lower part of tube; upper lip shorter than the lower, entire or emarginate; corolla-tube exerted; nutlets subglobose-ovoid, furrowed, dark brown, finely punctate. May.

Pebble beds. — Caucasus: Tal. Endemic. Described from Talysh. Type in Tbilisi.

32. *S. iberica* M. B. Fl. taur.-cauc. II (1808) 51; Boiss. Fl. or. IV, 731; Grossg. Fl. Kavk. III, 315. — *S. caucasica* C. Koch in Linnaea, XXI (1848) 693.

Perennial, 20–50 cm high; stems numerous, ascending; branches simple or branched, hispidulous or glabrous; cauline leaves narrowly linear-oblong, remotely blunt-serrate; floral leaves lanceolate, muticous, entire, the lower shorter, the upper as long as calyx, glabrous on both sides or with scattered short hairs; inflorescence spikelike; verticillasters 6–10-flowered, distant, the upper approximate; flowers short-pedicelated; 225 bracts obsolescent, setaceous; calyx tubular-campanulate, sulcate, with scattered hairs, the teeth triangular-lanceolate, as long as or shorter than the tube, terminating in a point 1.5–2 mm long; corolla purple, one-and-a-half times as long as calyx; upper lip shorter than the lower; lower lip with broadly suborbicular middle lobe and short rounded lateral lobes; filaments short, pubescent, equaling or exceeding calyx-tube; nutlets brown, glabrous, oblong-ovoid. May–August.

Mountain areas, dry slopes and thickets. — European part: Crimea; Caucasus: W., E. and S. Transc. Gen. distr.: Bal.-As. Min., Arm-Kurd. Described from Georgia. Type in Leningrad.

33. *S. angustifolia* M. B. Fl. taur.-cauc. II (1808) 52; Benth. Lab. gen. et sp. 558 et in DC. Prodr. XII, 486; Ldb. Fl. Ross. III, 419; Boiss. Fl. or. IV, 732; Briq. in Pflanzenfam. IV, 3a, 264; Shmal'g Fl. II, 341. — *S. tenuifolia* Pall. in Link. Enum. hort. Berol. II (1841) 109. — Ic.: Sweet, Brit. Fl. Gard. II (1826) 180. — Exs.: GRF, No. 1034.

Perennial, 40–60 cm high; stems slender, ascending, numerous, virgate, glabrous, with long subappressed branches; lower leaves narrowly linear-lanceolate, pinnatifid



PLATE XII. 1 – *Stachys baicalensis* Fisch., part of inflorescence, calyx, nutlet, corolla; 2 – *S. atherocalyx* C. Koch, calyx, corolla; 3 – *S. komarovii* Knorr., part of inflorescence, corolla, calyx, nutlet.



or pinnatipartite, with linear segments; other leaves simple, all sessile; floral leaves equalling flowers; inflorescence very long, spikelike; flowers pedicellate, paired in the leaf axils; bracts setaceous, shorter than calyx; calyx campanulate, glabrous or scabrous, the teeth lanceolate, two-fifths to one-half the length of the tube, spinous-tipped; corolla purple or whitish, more rarely yellowish, appressed-pubescent outside, one-and-a-half times as long as calyx; upper lip much shorter than the lower, broadly ovoid, rounded or shortly emarginate, the middle lobe of lower lip flabelliform, the lateral lobes ovoid. June–July.

Steppes and rocky slopes. — European part: V.-Don, Bl., Bes., Crim. **Gen. distr.:** Bal.-As. Min. Described from Crimea. Type in Leningrad.

Series 4. *Fruticulosae* Boiss. Fl. or. IV (1879) 716, emend. — Subshrubs with numerous stems, often woody at base; leaves oblong-spatulate, elliptical or rounded-ovate; verticillasters 2-flowered, more rarely 4-flowered; corolla pink or purple, rarely yellow.

34. *S. fruticulosa* M. B. Fl. taur.-cauc. II (1808) 51; Benth. Lab. gen. et sp. 564 et in DC. Prodr. II, 486; Ldb. Fl. Ross. III, 418; Boiss. Fl. or. IV, 737; Grossg. Fl. Kavk. III, 312.

Subshrubs 20–30 cm high, divaricately branched, woody at base; branches glabrous, with grayish bark; branches covered with short spreading hairs; leaves subsessile, 226 in clusters of 4–6, oblong-spatulate or linear, 7–13 mm long and 2–3 mm broad, entire or distantly dentate, the uppermost linear, 7–7.5 mm long and 1–1.5 mm broad, acuminate, exceeding the whorls, rugose beneath, with short appressed hairs, subglabrous above; verticillasters 2-flowered, distant; flowers pedicellate or sessile; bracts setaceous, obsolescent; calyx campanulate, sulcate, short-haired, the teeth triangular-lanceolate, terminating in a spine 1–1.5 mm long, half half the length of the tube; corolla light purple or pink, twice as long as calyx, the tube densely hairy from base to throat; upper lip shorter than the lower, shortly bidentate, short-haired above; lower lip 3-lobed, the middle lobe broadly reniform, undulate-margined, the lateral lobes oblong; filaments included in calyx-tube; nutlets obovoid, glabrous. May–June.

Mountains, on dry stony slopes. — Caucasus: Cisc. (Main Range), E. Transc. **Gen. distr.:** Iran. Described from the Caucasus. Type in Leningrad.

35. *S. sosnowskyi* Kapeller in Zam. po sistem.i geogr. rast. Tbil. bot. inst. AN GruzSSR, 16 (1951) 20.

Subshrub, 20–30 cm high; stems and older branches woody; stems slender, more or less branched from base; leaves small, the radical and the lower cauline rounded-ovate or broadly elliptical, 8–10 mm long and 6–7.5 mm broad, obtuse, coarsely crenate-dentate, on petiole 7.5–10 mm long, the middle cauline oblanceolate or narrowly elliptical, 10–15 mm long and 1.5–2 mm broad, attenuate at base, sessile, subobtusate at apex, with 1–3 short teeth in upper part; floral leaves similar, smaller, sessile,

dentate or entire in upper part, as long as or slightly shorter than calyx; verticillasters few, distant, 2-flowered; flowers short-pedicel; bracts equaling the pedicels, subulate; calyx 2-lipped, inconspicuously nerved, covered with scattered short hairs and small sessile glands: calyx-teeth triangular, spinescent, the upper connate higher up, ca. 1 mm long, two-fifths to one-half the length of the tube; corolla light pink or pink; upper lip entire, subacute; lower lip much longer, with slightly sinuate middle lobe; corolla-tube exerted; nutlets small, obovoid, dark brown, very finely reticulate. Fl. and fr. May.

Stony placers. Caucasus: S. Transc. **Gen. distr.:** Arm.-Kurd. Described from former Kara province. Type in Tbilisi.

Note. It may be assumed that differentiation between this and the preceding species is not sufficiently substantiated.

- 227 36. *S. araxina* Kapeller in Zam. po sistem. i geogr. rast. Tbil. bot. inst. AN GruzSSR, 16 (1951) 22. — *S. fruticulosa* M. B. var. *macrocheilos* Grossh. Fl. Kavk. III (1932) 313 (non Boiss.). — *S. macrocheilos* Sosn. in Tr. Az. OZFAN SSSR, I (1933) 42 (non Boiss.).

Subshrub, 20–40 cm high; stems and older branches woody; stems rather stout, tough, branching from base, the branches erect or slightly ascending; cauline leaves elliptical or oblanceolate, 20–25 mm long and 4–6 mm broad, subacute, attenuate at base, sessile, sharply denticulate in upper half, with scattered hairs beneath, glabrous above; floral leaves similar, smaller, entire or distantly dentate, equaling or exceeding the verticillasters; verticillasters 2-flowered, distant; flowers pedicellate; bracts subulate, whitish, as long as or shorter than pedicels; calyx infundibular, prominently nerved, the teeth triangular-lanceolate, terminating in a long, spinous point, as long as or slightly shorter than the tube; corolla brownish; upper lip rather broad, slightly emarginate, rarely entire; lower lip much longer than the upper, the middle lobe notched; corolla-tube included in calyx; nutlets obovoid, dark brown, smooth. June.

Clayey slopes. — Caucasus: S. Transc. Described from former Kara province. **Gen. distr.:** Arm.-Kurd. Type in Tbilisi.

37. *S. grossheimii* Kapeller in Tr. Tbil. bot. inst. XVI (1948) 223.

- Subshrub, 20–25 cm high; stems numerous, woody, branching from base; branches ascending, herbaceous, covered with short crisp hairs; cauline leaves lanceolate or elliptical, 8–18 mm long and 2.5 mm broad, abruptly attenuate at base, entire or only in upper part distantly and obscurely blunt-dentate, subobtuse to subacute; uppermost leaves similar, smaller, entire, slightly shorter to longer than calyx, short-haired; verticillasters 2-flowered, distant; flowers short-pedicel; bracts linear-subulate, 1.5–4 mm long; calyx tubular-campanulate, prominently nerved, sparsely puberulent, the teeth triangular-lanceolate, subulate-pointed, 4–5 mm long, slightly shorter than the tube; corolla pale pink or pink, with a purple stripe on each side at the base of upper lip, slightly pubescent except the lower part of tube; upper lip rather short and broad, shallowly emarginate or entire; lower lip much longer than the upper, the middle lobe broader than long, slightly emarginate or obscurely bidentate; corolla-tube included in calyx; nutlets large, subglobose-ellipsoid, smooth. May.
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Lower mountain belt, on dry slopes. — Caucasus: S. Transc. Described from Nakhichevan' ASSR. Endemic? Type in Tbilisi.

38. *S. odontophylla* Freyn in Oesterr. Bot. Zeitschr. XVI (1891) 12.

Perennial, 30–60 cm high; stems erect or ascending, branched, slender, brown, densely covered with short hairs; leaves ovate, 2–2.5 cm long, and 15–17 mm broad, rounded or subcordate at base, coarsely dentate, the lower exceeding, the upper equaling the whorls, the lower on petiole 5–10 mm long, the floral sessile, covered above with scattered short hairs, more densely beneath; verticillasters distant, 2–6-flowered, the upper approximate; bracts obsolescent, equaling the pedicels; calyx prominently nerved, covered with short appressed and spreading hairs, the teeth unequal, the two upper longer, one-third to one-half the length of calyx; corolla yellow or ochroleucous, equaling or exceeding calyx; upper lip much shorter than the lower, oblong-ovate, rounded at apex; lower lip 3-lobed, the middle lobe broad, undulate-margined, the lateral lobes very short. April.

Stony slopes. — Caucasus: W. Transc. (known only from Chorokh River). Gen. distr.: Arm.-Kurd., Iran. Described from Amasia. Cotype in Leningrad.

Series 5. *Lavandulifoliae* Knorr. — Subshrubs, 10–25 cm high; leaves linear-lanceolate or broadly elliptical, covered with long silky hairs; calyx-teeth longer than the tube.

39. *S. lavandulifolia* Vahl, Symb. Bot. I (1790) 42; Benth. Lab. Gen. et sp. 563; Ldb. Fl. Ross. III, 419; Boiss. Fl. or. IV, 743; Briq. in Pflanzenfam. IV, 3a, 265; Grossg. Fl. Kavk. III, 313. — *Sideritis calycantha* M. B. Fl. taur-cauc. III (1819) 393.

Subshrub, 10–25 cm high; stems numerous, ascending, woody at base, glabrous, covered in upper part with long fine spreading hairs; leaves numerous, crowded, linear-lanceolate or oblong, attenuate to petiole, parallel-veined, gray, densely covered on both sides with long fine hairs; inflorescence oblong, composed of numerous approximate 4–6-flowered verticillasters; bracts subsetaceous or linear, covered with  
229 short patent hairs; calyx covered with long fine silky hairs, the teeth narrowly linear, 10–12 mm long, 2–2½ times as long as the tube, this 4–5 mm long; corolla bright pink, shorter than calyx; upper lip shorter than the lower, rounded-oblong; lower lip 3-lobed, the middle lobe broadly rounded, hairy at margin; nutlets ovoid, glabrous. May–July. (Plate XIII, Figure 2.)

Mountain areas, on stony southern slopes. — Caucasus: E. and S. Transc., Tal.; Centr. Asia: Mtn. Turkm. Gen. distr.: Bal.-As. Min., Arm.-Kurd., Iran.

40. *S. boissieri* Kapeller in Zam. po sist. i geogr. rast. Tbil. bot. inst. AN GruzSSR, 16 (1951) 17. — *S. tomentosa* Bge. Lab. pers. (1873) 71, non Benth. — *S. lavandulifolia* Vahl. var. *brachyodon* Boiss. Fl. or. IV (1897) 743.



Perennial, 10–20 cm high; stems numerous, branched from base or in lower part, sometimes woody at base, covered with long spreading articulate and few short glandular hairs; leaves of sterile shoots closely approximate, elongate-spatulate, rounded at apex, entire, 25–30 mm long and 4–7 mm broad, on petiole 13–20 mm long; leaves on fertile shoots 1 or 2 pairs, these and floral broad-elliptic or rounded-elliptic, sessile, the floral reflexed, exceeding calyx-tube; leaves covered on both sides, more densely beneath, with long silky appressed and short stellate hairs, the lower side with sub-parallel veins; inflorescence few-flowered; verticillasters 4–6-flowered, the lower distant, the upper approximate; flowers on pedicel 1–2 mm long; bracts linear, long-haired; calyx infundibular, densely covered with spreading articulate and short stellate hairs; calyx-teeth subequal, more or less reclinate, gradually attenuate from lanceolate base, acute, slightly longer than the tube; corolla pinkish-violet, the upper lip rounded-elliptical, emarginate or entire, the lower lip with gently sinuate-margined middle lobe. June–July.

Alpine belt, on stony slopes. — Caucasus: S. Transc. Gen. distr.: Iran. Described from Iran. Type in Leningrad.

Series 6. *Zappanioides* Knorr. — Stems ascending, spreading; calyx-teeth unequal, as long as the tube; corolla pink; leaves obovate, glabrous on both sides.

41. *S. pauli* Grossh. Fl. Kavk. III (1932) 312. — *S. zappanioides* Woron. in Tr. Bot. inst. AN SSSR I, 1 (1932) 221.

Perennial, 15–25 cm high; stems numerous, prostrate or spreading, branched above, 230 finely puberulent; leaves obovate, short-petioled, crenate, rounded at apex, 10–12 mm long and 5–7 mm broad, glabrous on both sides; inflorescence of few verticillasters in upper part of the stem; verticillasters 2–5-flowered; flowers pedicellate; bracts obsolescent, as long as pedicels; calyx subglabrous, the teeth unequal, triangular-lanceolate, acuminate, as long as or slightly longer than the tube; calyx strongly accrescent and becoming campanulate in fruit; corolla pink, exceeding the calyx; upper lip much shorter than the lower, oblong; lower lip with broad-ovate middle lobe and oblong lateral lobes; corolla subglabrous above; filaments exerted, pubescent from base to middle; nutlets trigonous-subglobose, finely alveolate. June–August.

Mid-mountain and subalpine belts, on stony slopes. — Caucasus: E. Transc. Endemic. Described from Nukha. Type in Leningrad.

Series 7. *Maritimae* Knorr. — Plants branching nearly from base; leaves oblong, rounded at base, obliquely truncate or oval-spatulate; bracts setaceous; calyx-teeth lanceolate, sharply spinescent; flowers yellow.

42. *S. maritima* L. Mant. (1767) 82; Benth. Lab. Gen. et sp. 554; Boiss. Fl. or. IV, 745; Grossg. Fl. Kavk. III, 313. — Ic.: Rchb. Ic. fl. Germ. XVII, tab. 12; Fedch. and Fler. Fl. Evrop. Ross. 822.

Perennial, 15–30 cm high; stems branched from base, curved, covered in lower part with short retrorse hairs, with long setiform hairs under inflorescence; stems with numerous leaves at base; radical and lower cauline leaves oval-spatulate, tapering at base, 2.5–3.5 cm long and 1.5–2 cm broad, on petiole 4–5 cm long, with crenulate margin; upper cauline leaves oblong, short-petioled or sessile; all leaves obtuse, the lower longer, the upper shorter than the whorls, rugose, stramineous-green beneath, prominently veined, covered with appressed and partly spreading thick hairs, with finer scattered hairs above; verticillasters 4–6-flowered, the lower distant, the upper approximate; flowers pedicellate; bracts obsolescent, setaceous, equaling the pedicels; calyx tubular-campanulate, 5–6 mm long, densely appressed-hairy, the teeth lanceolate, sharply spinescent, two-fifths to one-half the length of the tube; corolla pale yellow; upper lip slightly shorter than the lower, broad-ovate, shortly bidentate, covered with short hairs, the middle lobe of lower lip broadly rounded, undulate-margined, the lateral lobes oblong-suborbicular; corolla-tube glabrous from base to middle, pubescent above; filaments slightly exserted, 231 pubescent from base to middle; nutlets broadly rounded-trigonus, finely alveolate. May–June.

Sea coast, on sands. — Caucasus: W. Transc. **Gen. distr.:** Med. (W. and E.), Bal.-As. Min. Described from S. Europe. Type in London.

43. *S. pubescens* Ten. Prodr. Fl. Nap. (1811) 34; Benth. Lab. Gen. et sp. (1832–1836) 554 et in DC. Prodr. XII, 483; Ldb. Fl. Ross. III, 416; Boiss. Fl. or. IV, 745; Briq. in Pflanzenfam. IV, 3a, 266; Grossg. Fl. Kavk. III, 313.

Perennial; stems 20–40 cm long; flowering branches ascending, branching, with scattered short hairs; lower leaves petiolate, oblong, rounded or obliquely truncate at base, crenate; upper leaves oblong-ovate, acuminate, sessile; all leaves stramineous-green, prominently veined and covered with scattered short hairs beneath, glabrous above; inflorescence long; verticillasters 4–6-flowered, the lower distant, the upper approximate; flowers pedicellate; bracts setaceous, equaling the pedicels; calyx tubular-campanulate, covered with both short and long hairs, the teeth lanceolate, spinous-tipped, as long as or slightly shorter than the tube; corolla pale yellow, hairy outside except in lower third of the tube; upper lip about as long as the lower, broad-ovate; lower lip with rounded middle lobe and short lateral lobes; filaments pubescent from base to middle, exserted. May–July.

Mountains, dry slopes and scrub. — European part: Crim.; Caucasus: Cisc., Dag.? W., E. and S. Transc., Tal. **Gen. distr.:** W. Med., Bal.-As. Min. Described from Italy. Type in Florence?

Series 8. *Inflatae* Knorr. — Subshrubs with numerous stems; cauline leaves linear or oblong, subsessile, amplexicaul; plants gray or silvery with stellate and branched hairs; upper lip of corolla always bidentate.

44. *S. inflata* Benth. Lab. Gen. et sp. (1832-1836) 562, 741 et in DC. Prodr. XII 491; Boiss. Fl. or. IV, 739; Grossg. Fl. Kavk. III, 314.

Subshrubs, 25–50 cm high, branched from base, the branches erect or curved, with appressed white tomentum, covered with stellate and branched hairs; leaves oblong-ovate, subsessile, 2.5–3 cm long and 7–10 mm broad; floral leaves similar but smaller, or linear, as long as or shorter than calyx, entire, rounded-obtuse at apex, the upper side with impressed veins, covered with branched and sparse stellate hairs, the lower  
232 side gray, velutinous with a dense cover of similar appressed hairs; verticillasters 4–6-flowered, the lower very distant, the upper approximate; bracts oblong-linear, half the length of calyx, slightly curved, covered with branched hairs; calyx broadly campanulate, 8–10 mm long, densely covered with branched hairs, accrescent in fruit, the teeth subequal, ovate or ovate-oblong, acuminate, one-third to two-fifths the length of the tube; corolla purple or pink, the tube slightly exerted, pubescent from base to throat; upper lip shorter than the lower, shortly bidentate, puberulent; lower lip with broadly reniform middle lobe and ovate lateral lobes; filaments exerted, pubescent. May–June.

Lower and middle mountain belt, on stony slopes. — Caucasus: S. Transc. (Karabakh).  
Gen. distr.: Arm.-Kurd., Iran. Described from Iran. Type in London.

45. *S. stchtschegleewii* Sosn. from Grossg. Opred. rast. Kavk. (1949) 339. — *S. inflata* Benth. var. *caucasica* Stschegleew from Grossg. Fl. Kavk. III (1932) 314.

Subshrub; stems numerous, curved, ascending or spreading, 30–45 cm long, with a sheathlike cover of tomentum from base, less compactly covered above with thick branched hairs; leaves oblong to suborbicular, thick, 23–30 mm long and 15–18 mm broad, on petiole 4–12 mm long; upper leaves similar but smaller, short-petioled or sessile; all leaves entire, silvery, densely tomentose, above with thickish appressed branched hairs, prominently veined beneath, with similar indument; bracts small, oblong-linear, with hairs as on leaves, half the length of calyx or shorter; verticillasters numerous, 4–6-flowered, the lower distant, the upper approximate; flowers sessile; calyx tubular-campanulate, covered with branched and scattered capitate-glandular hairs, 9 mm long, the teeth oblong-ovate, slightly pointed, 3–4 mm long; corolla pubescent above, pale pink, the tube scarcely exerted, glabrous from base to middle; upper lip shorter than the lower, broad-ovate, bidentate or entire; lower lip with broadly flabelliform middle lobe and broad-ovate lateral lobes; nutlets broadly ovoid, dark brown, naked, smooth. May–June.

Middle mountain belt, on calcareous rocks, screes and pebble beds. — Caucasus: S. Transc. Endemic. Described from Transcaucasia. Type in Tbilisi.

46. *S. turcomanica* Trautv. in Tr. Bot. sada, IX (1886) 463; O. and B. Fedch. Perech. rast. Turk. V, 165. — *S. turkestanica* Trautv. (lapsu) ex Radde, Transkas-  
233 pien (1890) 118. — Exs.: HFAM, No. 219.

Subshrub, with numerous, partly dead stems; young stems erect, simple, white, densely covered with appressed stellate hairs; leaves oblong-linear, the cauline clasping; petioles stellate-hairy; upper leaves linear, subsessile; all leaves entire, with scattered



stellate hairs above, prominently veined and with similar but more profuse and closely appressed hairs beneath; inflorescence racemiform, the lower verticillasters very distant, the upper approximate; flowers short-petioled; bracts setaceous, obsolescent, as long as or shorter than pedicels; calyx tubular-campanulate, thinly white-tomentose, the teeth lanceolate, acuminate; corolla-tube glabrous from base to middle, covered above with scattered simple hairs, slightly exserted; upper lip densely stellate-pubescent above, broad-ovate, shorter than the lower lip; middle lobe of lower lip broadly rounded, the lateral lobes short; filaments included in corolla; nutlets trigonous, naked. May–June. (Plate XIII, Figure 1.)

Mountain areas, on stony slopes. — Centr. Asia: Mtn. Turkm. Endemic. Described from Kizil-Arvat. Type in Leningrad.

47. *S. fominii* Sosn. from Grossg. Fl. Kavk. III (1932) 313. — *S. lavandulaefolia* var. *brachyodon* Boiss. Fl. or. IV (1879) 743. — *S. tomentosa* Bge. Lab. pers. (1873) 171, non Benth.

Perennial; stems 20 cm long, ascending; lower leaves oblong, obtuse, attenuate at base into petiole; upper leaves lanceolate, acute, prominently veined, cinereous with short stellate pubescence; inflorescences few-flowered, oblong; verticillasters 3–4-flowered; calyx-teeth as long as the tube, lance-subulate, sharply spinescent, spreading; calyx gray, with dense short hairs; corolla bright pink, as long as or longer than calyx. May–June.

Middle mountain zone, on stony slopes. — Caucasus: S. Transc. Endemic. Described from Nakhichevan' ASSR. Type in Tbilisi.

48. *S. trinervis* Aitch. et Hemsl. in Trans. Linn. Soc. ser. 2, III (1888) 97.

Subshrub, 35–45 cm high, branched, rather widely spreading; lower leaves sub-amplexicaul, ovate-lanceolate or oblong, obtuse to subacute, 40–50 mm long and 7–8 mm broad, grayish-green; floral leaves similar, 18–25 mm long and 3–4 mm broad, sessile, very densely covered with sessile appressed stellate hairs, 3-veined; inflorescence loosely racemiform; verticillasters very distant, 2-flowered; flowers on 234 pedicels 2–3 mm long; bracts setaceous, soon deciduous; calyx campanulate, with 10 furrows, stellate-pubescent; calyx-teeth equal, attenuate from broad base, subobtuse, 4 mm long; calyx-tube 6 mm long, broadly campanulate in fruit; corolla white, slightly exceeding calyx; upper lip broad, shorter than the lower, bidentate; middle lobe of lower lip broadly rounded, with somewhat undulate margin, lateral lobes short, rounded; filaments about as long as corolla-tube; nutlets oblong-ovoid, rounded at apex, finely alveolate.

Desert-steppe belt of foothills. — Centr. Asia: Mtn. Turkm. (Kushka district).

Gen. distr.: Iran (Afghanistan). Described from N.W. Afghanistan. Type in London; cotype in Leningrad.

Section 3. *Olisia* Dumort. ex Boiss. Fl. or. IV (1879) 716. — Annual plants.



PLATE XIII. 1 — *Stachys turcomanica* Trautv., general aspect, corolla, calyx, nutlet; 2 — *S. lavandulifolia* Vahl., general aspect, nutlet, corolla, calyx.

49. *S. annua* L. Sp. pl. (1762) 813; Benth. Lab. Gen. et sp. 554 et in DC. Prodr. XII, 481; Ldb. Fl. Ross. III, 415; Boiss. Fl. or. IV, 743; Shmal'g. Fl. II, 340; Kryl. Fl. Zap. Sib. IX, 2366; Grossg. Fl. Kavk. III, 310 and Opred. rast. Kavk. 337. — *Betonica annua* L. Sp. pl. (1753) 573.

Annual, 15–35 cm high; stems simple or branched, often glabrous at base, covered above with short retrorse hairs, more densely hairy under inflorescence; lower leaves oblong-ovate, cuneate at base, crenate; upper leaves lanceolate, acute, serrate; terminal leaves smaller, sessile; bracts filiform or linear, long-ciliate; inflorescence long, spikelike; lower 2 or 3 verticillasters distant, the upper approximate; calyx sparsely villous, the teeth triangular-lanceolate, subulate-pointed, curved, as long as the tube; corolla ochroleucous, twice as long as calyx, the upper lip rounded, the lower lip with notched middle lobe and rounded-ovate lateral lobes; nutlets broadly ovoid, obtusely trigonous, finely alveolate. June–October.

A weed in fields, fallows and truck gardens. — European part: Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bes., Bl., Crim.; Caucasus: Cisc., Dag., W., E. and S. Transc.; W. Siberia: throughout. **Gen. distr.:** Centr. and Atl. Eur., Arm.-Kurd. Described from Centr. Europe. Type in London.

**Economic importance.** The seeds contain 36.69% oil.

237 50. *S. arvensis* L. Sp. pl. (1762) 814; Benth. Lab. Gen. et sp. 550 et in DC. Prodr. XII, 477; Ldb. Fl. Ross. III, 415; Boiss. Fl. or. IV, 747; Shmal'g. Fl. II, 340.

Annual, 10–15 cm high; stems branched, hirsute; lower leaves ovate-cordate, crenate; upper leaves sessile, ovate or lanceolate, crenate-serrate, yellowish-green above, with scattered hairs beneath; inflorescence with solitary flowers in lower part, with 3-flowered verticillasters above; calyx tubular-campanulate, sulcate, hirsute, the teeth lanceolate, mucronate; corolla pink, included in calyx. June–October.

Sandy places. — European part: Kar.-Lap. **Gen. distr.:** Med. (W. and E.), Atl. Eur. Type in London.

## Genus 1282.\* *Betonica*\*\* L.

L. Sp. pl. (1753) 573. — *Stachys* sect. II *Betonica* Benth. Lab. Gen. et sp. (1832–1836) 526 et 532.

Calyx tubular-campanulate, with 5 equal teeth; corolla-tube mostly exserted, without a ring of hairs inside; upper lip of corolla concave; lower lip 3-lobed, the middle lobe larger; anther-cells nearly parallel; anterior stamens scarcely diverging after flowering; style lobes subequal; verticillasters many-flowered, approximate;

\* Treatment by O. E. Knorring.

\*\* The derivation of the name *Betonica*, which was used by ancient Latin writers to denote *B. officinalis* L., is not clear. Pliny attributed its origin to Vettones, a tribe that inhabited present-day Spain. According to Wittstein, the name is derived from Celtic bentonic (ben, head, ton, well). Both interpretations are dubious.



inflorescence rather long, spikelike or short, loosely few-flowered. Perennial herbs with broad-ovate or lanceolate leaves.

The genus contains up to 15 species.

1. Corolla 20–25 mm long . . . . . 2.
- + Corolla 30–35 mm long . . . . . 4.
2. Leaves broad-ovate, deeply cordate or oblong-ovate, oblique at base . . . . . 3.
- + Leaves lanceolate, cordate at base, closely crenulate, stellate-pubescent beneath; corolla light purple . . . . . 7. **B. orientalis** L.
3. Lower leaves coarsely crenate, 10–13 cm long and 5–6 cm broad, thin, green, on petiole 7–15 cm long; corolla purple . . . . . 5. **B. officinalis** L.
- + Lower leaves rounded-dentate, 13–15 cm long and 4–5 cm broad, on petiole 2–3 cm long; corolla lilac . . . . . 6. **B. foliosa** Rupr.
- 238 4. Leaves cordate or cordate-ovate; inflorescence capitate or oblong, lax, interrupted; corolla purple, 2½–3 times as long as calyx. . . 2. **B. grandiflora** Willd.
- + Leaves lanceolate . . . . . 5.
5. Lower leaves narrowly lanceolate, 9–20 cm long and 2.5–3 cm broad, long-haired beneath; corolla three times as long as calyx . . . . . 3. **B. ossetica** (Bornm.) Chinth.
- + Lower leaves 10–15 cm long and 2–3 cm broad, stellate-hairy beneath; corolla yellow, purple or pink . . . . . 6.
6. Calyx-teeth as long as or slightly shorter than the tube; stems covered with stellate and branched hairs; corolla purple. . . 4. **B. abchasica** (Bornm.) Chinth.
- + Calyx-teeth one-third to two-fifths the length of the tube; stems covered with simple retrorse hairs; corolla yellow or pink . . . . . 1. **B. nivea** Stev.

1. **B. nivea** Stev. in Mem. Soc. Nat. Cur. Mosq. III (1812) 266; M. B. Fl. taur.-cauc. III, 399; Benth. in DC. Prodr. XII, 461; Boiss. Fl. or. IV, 750; Ldb. Fl. Ross. III, 409; Grossg. Fl. Kavk. III, 309. — *Stachys nivea* Benth. in DC. Prodr. XII (1848) 461 in synonym non Labill.; Briq. in Pflanzenfam. IV, 3a (1897) 261. — *S. discolor* Benth. Lab. Gen. et sp. (1832–1836) 533. — Exs.: Fl. Cauc. exs. No. 45.

Perennial, 15–50 cm high; stems simple, erect or curved, covered with long retrorse hairs; radical leaves numerous, oblong-lanceolate to narrowly lanceolate, 12–13 cm long, 2–3 cm broad, coarsely crenate; cauline leaves similar, smaller, the upper side alveolate, covered with scattered bristly and stellate hairs, the lower side white-tomentose, prominently veined, with stellate and long hairs; lower leaves with petiole 7–10 cm long, the upper sessile; flowers in a capitate inflorescence and 2 or 3 distant verticillasters below; bracts ovate-lanceolate, gray, covered with stellate and monoradial hairs; calyx tubular-campanulate, reticulate, covered with long implexed hairs, the teeth triangular-lanceolate, one-third to two-fifths the length of the tube; corolla pink or yellow, 2–2½ times as long as calyx, the tube curved, covered with antrorse and retrorse hairs; upper lip oblong, rounded at apex or shortly emarginate; lower lip longer, the middle lobe broadly oblong or rounded or undulate-margined, the lateral lobes half the length, rounded; nutlets dark brown, subtriangular-obovoid, 239 finely alveolate. May–July.

Subalpine and alpine mountain belts, on rocky slopes. — Caucasus: Dag., E. Transc. Endemic. Described from Azerbaidzhan, from an area near Dzimene mineral source (the village of Khinagul). Type and paratype in Helsinki.

2. *B. grandiflora* Willd. Sp. pl. III (1800) 96; Benth. in DC. Prodr. XII, 761; Boiss. Fl. or. IV, 751; Ldb. Fl. Ross. III, 409. — *Stachys grandiflora* Benth. Lab. Gen. et sp. (1832–1836) 533; Briq. in Pflanzenfam. IV, 3a, 261. — *Betonica macrantha* C. Koch in Linnaea, XXI (1848) 683. — Ic.: Rchb. Ic. bot. tab. 415. — Exs.: Fl. Cauc. exs. No. 244.

Perennial, 20–50 cm high; stems simple, erect or slightly curved, covered with reflexed hairs; leaves ovate or cordate, coarsely crenate, with scattered articulate hairs above, prominently veined and more densely covered with bristly hairs beneath; lower leaves with petiole 13–15 cm long; floral leaves sessile; flowers in verticillasters forming a short capitate few-flowered inflorescence; bracts ovate-lanceolate, sparsely covered with long hairs, the margin densely hairy; calyx tubular-campanulate, sulcate, with scattered branched hairs along the furrows, the teeth triangular-subulate, spinescent, two-thirds the length of the tube; corolla pink, 3 to 4 times as long as calyx, the tube exserted, sparsely pubescent; upper lip broad-ovate, rounded at apex, toothed or sinuate; lower lip with broad-ovate middle lobe and broad-ovate lateral lobes. June–July.

Subalpine and alpine belts, in meadows. — Caucasus: Cisc., Dag., W., E. and S. Transc. Gen. distr.: E. Anatolia, Iran. Type in Berlin.

The following varieties have been distinguished:

var. *macrantha* (C. Koch) Sosn. in herb. — *B. macrantha* C. Koch, l. c. — Inflorescence lax, few-flowered; corolla 35 mm long. — E. Transc.

var. *albiflora* Troitzky in herb. — Corolla white; cauline leaves rounded-ovate, deeply crenate. — E. Transc.

3. *B. ossetica* (Bornm.) Chinth. in Zam. po sistem. i geogr. rast. Tbil. bot. inst. AN GruzSSR (1951) 31. — *Betonica nivea* Stev. ssp. *ossetica* Bornm. in Fedde, Repert. XV (1936) 370. — Ic.: Chinth. l. c. 36. fig. 2; Fl. Gruz. VII, 321.

Perennial, 30–50 cm high; stems simple, erect, sturdy, pubescent; leaves lanceolate, 9–20 cm long and 2.5–3 cm broad; floral leaves similar but smaller, the upper-  
240 most small, coarsely rounded-dentate; lower leaves long-petioled, green above, thinly covered beneath with long white hairs; inflorescence branched; verticillasters few-flowered, distant; bracts lanceolate, covered with long hairs; calyx tubular-campanulate, covered, more densely above, with long stiff hairs, the teeth lanceolate, subulate-tipped, half the length of the tube; corolla yellow, three times as long as calyx. July.

Caucasus: Cisc. and E. Transc. Endemic. Described from plants collected by Markovich in 1898 by the river Arkhodon in Osetia. Type in Tbilisi.

4. *B. abchasica* (Bornm.) Chinth. in Zam. po sistem. i geogr. rast. Tbilissk. bot. inst. AN GruzSSR (1951) 32. — *B. nivea* var. *abchasica* N. Pop. ex Grossh. Fl. Kavk. III

(1932) 309. — *B. nivea* ssp. *abchasica* Bornm. in Fedde, Repert. XV (1936) 370/818. — **Ic.**: Chinth. 1. c. 36, fig. 3.

Perennial, 15–30 cm high; stems erect, simple, sturdy, covered with stellate, monoradial and branched hairs; lower leaves lanceolate, 5–15 cm long and 1–2 cm broad; cauline leaves similar, smaller, crenate-dentate, green above, with scattered short hairs, white-tomentose beneath with appressed inequiradial and monoradial hairs; lower leaves with petiole the length of blade; flowers in capitate inflorescences of 2 or 3 few-flowered verticillasters and one more distant verticillaster; bracts lanceolate, 9–10 mm long, short-acuminate, half the length to length of calyx; calyx tubular-campanulate, the teeth linear-lanceolate, 5–6 mm long, half the length of tube or less, the tube covered with monoradial hairs; corolla purple or pink, one-and-a-half times as long as calyx; upper lip shorter than the lower, obovate; nutlets ovoid, 4 mm long, 3 mm broad, truncate at apex. June–July.

Subalpine and alpine mountain belts, at altitudes between 2200 to 2400 m, on limestone. — Caucasus: W. Transc. Endemic. Described from plants collected by Voronov in Pshitsa Mountains, Abkhazia. Type in Tbilisi.

5. *B. officinalis* L. Sp. pl. (1753) 573; Benth. in DC. Prodr. XII, 460; Boiss. Fl. or. IV, 752; Ldb. Fl. Ross. III, 407; Grossg. Fl. Kavk. III, 309. — *Stachys officinalis* (L.) Trev. ex Briq. in Pflanzenfam. IV (1897) 261. — *Betonica glabrata* C. Koch in Linnaea, XXI (1848) 633. — *Stachys betonica* Benth. Lab. Gen. et sp. (1836) 532, non Crantz nec Scop.; Shmal'g. Fl. II, 342; Briq. in Pflanzenfam. IV, 3a, 261; Fl. Yugo-Vost. VI, 160; Fl. Zap. Sib. XI, 3466. — **Ic.**: Zemlinskii, Lekarstv. rast. SSSR, 260; Hegi, Ill. Fl. V, 4, tab. 227, fig. 4.

- 241 Perennial, 50–100 cm high; rhizome fibrous; stems erect, more or less covered with long stiff spreading hairs; lower leaves broad-ovate, deeply cordate at base, obtuse, coarsely crenate, 8–12 cm long and 3–5 cm broad, covered on both sides with scattered hairs; cauline leaves usually 2 pairs, the lower long-petioled, the upper short-petioled; verticillasters many-flowered, forming compact spikelike inflorescences, only some lower verticillasters distant; bracts ovate, acute, as long as or shorter than calyx; calyx hirsute, the teeth triangular, acuminate, 2–3.5 mm long; corolla purple, covered outside with short hairs, the tube exserted; upper lip ovate or oblong, sinuate or crenulate; lower lip with broad-ovate middle lobe and short oblong-ovate lateral lobes; filaments pubescent, exserted; nutlets oblong-ovoid, concave, glabrous. June–September.

Meadows, wood margins, open woods and coppices. — European part: Kar.-Lap., Balt., Dv.-Pech., Lad.-Ilm., V.-Kama, U. Dnp., L. V.; Caucasus: Cisc., Dag., W., E. and S. Transc.; W. Siberia: Ob, U. Tob., Alt. **Gen. distr.**: Centr. Eur., Med., Bal.-As. Min. Described from Europe. Type in London.

**Economic importance.** The plant contains bitter principles and tannins; it yields fatty oil. Long used in popular medicine.

6. *B. foliosa* Rupr. in Mem. Acad. Sc. Petersb. VII, ser. XIV, 4 (1869) 66. — *Stachys betonicaeflora* Rupr. l. c.; O. and B. Fedch. Perech. rast. Turk. V, 165. —



*Betonica officinalis* γ. *major* Herd. ex Rgl. in Bull. Soc. Nat. Mosc. XLI; 2 (1869) 387. — *Stachys betonicifolia* Rgl. in Tr. Bot. sada, VI (1879) 366.

Perennial, 75–100 cm high; stems coarse, with dense long hairs from base, with more scattered hairs above; leaves oblong-ovate, oblique at base, with rounded teeth, 13–15 cm long and 4–5 cm broad, the upper 5–6 cm long and 2–3 cm broad, serrate, the terminal lanceolate, entire, with scattered short hairs above, long-haired on the veins beneath; lower leaves short-petioled, upper leaves sessile; flowers sessile; verticillasters 10–12-flowered, forming compact spikelike terminal inflorescences, only 1 or 2 lower verticillasters distant; bracts lanceolate, 12–17 mm long, as long as or shorter than calyx; calyx tubular, covered with scattered short hairs, the tube 10–12 mm long, the  
242 teeth lanceolate, acute, 5–6 mm long; corolla lilac, the tube strongly exserted, 12–15 mm long, covered with scattered hairs from throat to middle; upper lip slightly curved, as long as the lower, hairy above; lower lip with broad-ovate middle lobe, the lateral lobes as long, obovate; filaments exserted; nutlets trigonous, longitudinally furrowed. June–August.

Wood and scrub belt, wood openings, scrub and juniper woods. — Centr. Asia: Pam.-Al., T. Sh. Endemic. Described from Tien Shan. Type in Leningrad.

7. *B. orientalis* L. Sp. pl. (1753) 573; Benth. in DC. Prodr. XII, 461; Boiss. Fl. or. IV, 750; Grossg. Fl. Kavk. III, 308. — *B. macrostachya* Wender. in Flora, IX (1826) 353. — *B. hirsuta* C. A. M. Verzeichn. (1831) 95, non L. — *Stachys longifolia* Benth. Lab. Gen. et sp. (1832–1836) 533.

Perennial, 30–60 cm high; stems coarse, erect, covered with retrorse bristly hairs; leaves ovate-lanceolate, cordate at base, obtuse at apex, crenate; radical and lower cauline leaves long-petioled, the petioles pubescent; floral leaves subsessile; upper side of leaves green, with scattered hairs, lower side distinctly veined, grayish, with copious appressed stellate hairs; inflorescence very dense, compact, oblong, spikelike; bracts ovate-lanceolate, densely covered with stellate and monoradial hairs, as long as or shorter than flowers; calyx broadly tubular, 13 mm long, the subulate teeth one-third to two-fifths the length of the tube; corolla purple; upper lip as long as or shorter than the lower; lower lip with broadly rounded middle lobe and rounded lateral lobes; corolla-tube covered with scattered hairs; anthers and style exserted. July.

Dry slopes, scrub. — Caucasus: S. and E. Transc. Gen. distr.: Arm.–Kurd. Described from “the Orient.” Type in London.

Genus 1283.\* *Phlomidosechema*\*\* (Benth.) Vved.

Vved. in Bot. mat. gerb. inst. AN SSSR, IX, 1 (1941) 59

Calyx narrowly campanulate; corolla included in calyx-tube, the upper lip shorter than the lower; filaments very short, unappendaged, included in corolla-tube, one pair

\* Treatment by O.E. Knorring.

\*\* From the generic name *Phlomis* and the Greek word *schema*, form, appearance.

longer; tube without a ring of hairs; bracts obsolescent, filiform, early deciduous or absent. Grayish-tomentose plants; lower leaves oblong-ovate, acuminate, sessile; floral  
243 leaves similar but smaller; inflorescence long, the lower 4–5 verticillasters distant, the upper 2 or 3 approximate, 2–4-flowered. Perennial herb.

A monotypic genus, growing in Central Asia, Afghanistan and the Himalayas.

1. **Ph. parviflorum** (Benth.) Vved. in Bot. mat. gerb. Bot. inst. AN SSSR, IX, 1 (1941) 54. — *Stachys parviflora* Benth. in DC. Prodr. XII (1848) 490; Boiss. Fl. or. IV, 740; Hook. Fl. Brit. Ind. IV, 677; Briq. in Pflanzenfam. IV, 3a, 265.

Low perennial, branching from base; stems tomentose with copious, closely appressed, branched hairs and scattered glandular hairs; leaves oblong-ovate, acuminate, thick sessile, 4 cm long or longer, 1.5–1.8 cm broad, tomentose, covered on both sides with branched and glandular hairs; upper leaves smaller; inflorescence long; flowers sessile, in 2–4-flowered verticillasters; bracts soon deciduous; calyx narrowly campanulate, tomentose, covered with branched hairs, the teeth linear, connivent at apex, two-fifths to one-half the length of the tube; corolla white or pink (?); upper lip flat, about half the length of the lower, short-toothed at apex; lower lip with ovate middle lobe; filaments short, all included in corolla-tube, the lower longer; style with unequal lobes; corolla-tube without a ring of hairs. August.

Stony places. — Centr. Asia: Pam.-Al. **Gen. distr.:** Iran, Ind.-Him. Described from Kabul area. Type in London.

## Genus 1284.\* **Chamaesphacos\*\*** Schrenk

Schrenk, Enum. pl. nov. (1841) 27

Calyx tubular-campanulate, 10-nerved, weakly 2-lipped, the upper three teeth longer, of these the central longest, the two lower teeth shorter, triangular at base, gradually tapering to a subulate point; corolla with filiform tube 11–14 mm long and 1 mm broad, the limb bilabiate; upper lip erect, exceeding the lower, slightly emarginate; lower lip spreading, 3-lobed, the lobes obovate; stamens 4, subequal, inserted in throat; style 2-parted at apex; nutlets oblong, 3 mm long and 1 mm broad, naked, black, sometimes dark-spotted, rounded at apex, a narrow membranous margin running the whole length of the nutlet.

One species, distributed in sandy deserts of Soviet Central Asia. This species evidently grows also in Iran and Afghanistan.

- 244 1. **Ch. illicifolius** Schrenk, Enum. pl. nov. (1841) 28; Ldb. Fl. Ross. III, 407; Boiss. Fl. or. IV, 680; Kar. et Kir. Enum. pl. soongor. 156. O. and B. Fedch. Perech. rast. Turk. V, 163. — **Ch. longiflorus** Bornm. et Sint. in Bornm. Pl. Nonnul. ex As.

\* Treatment by L.A. Kupriyanova.

\*\* From Greek *chamai*, low, small, and *sphakos*, a sagelike herb.

Med. nov. I (1903) 51; O. and B. Fedch. op. cit. V, 163. — *Ch. ilicifolius* var. *longiflorus* Bornm. et Sint. (olim in Sched. No. 342).

Annual, 10–15 cm high, glabrous, often branched from base, with divaricate branches; leaves petiolate, oblong-ovate, acuminate, the margin with sharp subulate-pointed teeth, the upper side glabrous, the lower side sometimes with long crisp hairs on the prominent veins; verticillasters 4–6-flowered, the lowermost sometimes 2-flowered; bracts short, subulate; calyx subcylindric in flower, 6 mm long, 10-nerved, more or less covered outside with long crisp hairs, white-villous in throat, the teeth to 2.5 mm long; fruiting calyx campanulate, accrescent, finally to 10 mm long, with teeth to 6 mm long; corolla reddish-violet, the limb more intensely red, the tube slender, 12 mm long, the limb 3 mm long; upper lip erect, oblong, slightly emarginate; lower lip 3-lobed, the lobes obovate; nutlets 3 mm long, 1 mm broad, membranous at sides and at apex, cylindric, black or brownish with black speckles, completely naked. April, May.

Sandy deserts and hummocky sands. — Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K., Amu D., Syr D., Pam.-Al. **Gen. distr.:** Iran. Described from Lake Balkhash. Type in Leningrad.

Tribe 4. SALVIEAE Dumort. Anal. fam. (1829) 22; Briq. in Pflanzenfam. IV, 3a (1895) 208 et 270. — Calyx bilabiate of the  $3/2$  type; corolla-tube included in calyx or exserted; upper lip concave, falcate or subulate; lower lip spreading; perfect stamens 2, the upper stamens reduced or absent (in very rare instances only the upper stamens developed); connective linear-lanceolate, jointed with filament, mobile or fixed, bearing a single fertile locule at the posterior end, sterile at the anterior end. Herbs or subshrubs.

#### Genus 1285.\* *Salvia*\*\* L.

L. Sp. pl. (1753) 23; Moench, Meth. pl. 372

Calyx campanulate, tubular-campanulate, conical or tubular, not modified or slightly accrescent in fruit (very rarely strongly accrescent), the upper lip 3-toothed; calyx-  
245 tube with or without a ring of hairs; corolla always bilabiate, the upper lip hooded, falcate or erect; middle lobe of lower lip much larger than the lateral lobes (very rarely of same size); stamens 2, unequal, the upper reduced to small staminodes or suppressed; staminal connective linear-filiform, mobile or immobile at articulation with filament, shorter to longer than the filament, the arms equal or unequal; posterior anther-locules fertile, the anterior mostly sterile, modified or absent; style filiform; stigma 2-lobed; nutlets ovoid or globose or sometimes subtrigonal, smooth. Perennial herbs or subshrubs, with simple or pinnate leaves.

\* Treatment by E.G. Pobedimova.

\*\* From Latin *salvare*, to heal, as many species of this genus are used medicinally.



Type species *S. aegyptiaca* L.

The genus contains more than 500 species, distributed in all parts of the Old and the New World. The scope of the genus *Salvia* has been variously conceived so that a critical revision of the genus as a whole would be required to determine the exact number of species.

**Economic importance.** All species contain essential oil. Many species have long been known for their medicinal value (e.g., *S. officinalis*). There is still much to be learned about the composition of the various essential oils and their potential use. Best known in this respect is *S. sclarea*, on account of the relatively high yield of essential oil that finds various applications. This species has long been widely cultivated.

1. Staminal connective as long as or shorter than filament, arched, with subequal arms . . . . . 2.
- + Staminal connective longer than filament, mostly several times as long, straight, not arched . . . . . 25.
2. Verticillasters 2-flowered; flowers solitary in the axils of floral leaves; pedicels very long, with minute bract at or slightly above the middle . . . . . 3.
- + Plants with other characteristics . . . . . 7.
3. Calyx covered with simple hairs . . . . . 20. *S. schmalhauseni* Rgl.
- + Calyx glandular-hairy . . . . . 4.
4. Corolla-tube included in the calyx or very slightly exserted; calyx 16–20 mm long, the teeth triangular, short-acuminate . . . . . 23. *S. aequidens* Botsch.
- + Corolla-tube exserted half its length or the length of calyx . . . . . 5.
5. Stem glandular-pubescent in inflorescence; pedicels 6–8 mm long . . . . . 22. *S. drobovii* Botsch.
- + Stem glabrous in inflorescence; pedicels 7–12 mm long . . . . . 6.
6. Calyx-lips subequal, the teeth of upper lip subequal, the lateral teeth incurved; stem always repeatedly branched . . . . . 24. *S. campylodonta* Botsch.
- + Lower lip of calyx longer; lateral teeth of upper lip longer than the middle teeth, not incurved; stem mostly simply branched . . . . . 21. *S. margaritae* Botsch.
- 7 (2). Leaves simple or deeply lobed . . . . . 8.
- + Leaves pinnatilobate . . . . . 15.
8. Leaves elliptical, oblong or oblong-lanceolate, (3.5) 4.5 (5.5) cm long, (1.5) 2 (2.5) cm broad; inflorescence an elongate pyramidal raceme with 2–3 pairs of branches; flowers very small, 7–8 mm long; calyx 2–3 mm long; a glandular-hairy annual . . . . . 25. *S. plebeja* R. Br.
- + Leaves and flowers much larger . . . . . 9.
9. Nearly all leaves in radical rosette . . . . . 10.
- + Leaves evenly distributed along the stem . . . . . 12.
10. Leaves broadly elliptical to suborbicular, doubly dentate or crenate, (8) 14 (15) cm long, (6) 9 (12) cm broad; upper lip of calyx 3-toothed, longer than the lower; upper lip of corolla recurved . . . . . 19. *S. forskaehlei* L.
- + Leaves elliptical, oblong or suboblong-ovate, 3.5–7 cm long, (1) 2 (3) cm broad, deeply lobed; upper lip of calyx 2-toothed, about as long as the lower; upper lip of corolla broad, with revolute margins . . . . . 11.

11. Corolla outside and anthers covered with fine implexed hairs; middle stem internodes subglabrous, with isolated, short, basally thickened, appressed hairs . . . . . 16. *S. glabricaulis* Pobed.
- + Corolla outside and anthers glabrous or with very few hairs; middle stem internodes densely covered with long fine spreading multicellular hairs intermixed with long and short stipitate glands . . . . . 17. *S. lilacinocoerulea* Nevski.
12. Leaves very large, (7) 12 (20) cm long, (4) 6.5 (11) cm broad, smooth, not rugose; flowers yellow; upper lip of corolla falcate, compressed laterally . . . . . 18. *S. glutinosa* L.
- + Leaves small, (3.5) 9 (12) cm long, (0.8) 3.5 (5.5) cm broad, oblong-lanceolate or ovate, rugose; flowers violet or blue; upper lip of corolla straight . . . . . 13.
13. Verticillasters 2–4-flowered; pedicels 2–3.5 cm long . . . . . 3. *S. trigonocalyx* Woron.
- 247 + Verticillasters 6–10-flowered; pedicels 3–7 mm long . . . . . 14.
14. Calyx 9–10 mm long, crisp-pubescent; corolla violet, 2–2.5 cm long; leaves narrowed at base . . . . . 1. *S. officinalis* L.
- + Calyx 12–17 mm long, covered with scattered long multicellular hairs and short-stipitate large-headed glands intermixed with small-headed; corolla blue, 3–4 cm long; leaves broadly rounded or cordate at base. . . . . 2. *S. grandiflora* Etling.
- 15 (7). Stem leafless or cauline leaves relatively small . . . . . 16.
- + Stem uniformly leafy . . . . . 19.
16. Leaves with 2 or 3 pairs of small elliptical segments and a large terminal segment (5.5) 9 (12) cm long, (2.5) 5 (7.5) cm broad; cauline leaves and inflorescence branches conjugate; flowers blue . . . . . 8. *S. ringens* Sibth.
- + Leaf segments alike; cauline leaves and inflorescence branches ternate; flowers white . . . . . 17.
17. Calyx covered with long- and short-stipitate glands; upper lip of calyx 2-toothed, all teeth subequal . . . . . 13. *S. lipskyi* Pobed.
- + Calyx covered with fine multicellular hairs interspersed with short-stipitate glands; upper lip of calyx 3-toothed, the middle tooth very small; all calyx-teeth subulate-pointed . . . . . 18.
- ++ Calyx-teeth not subulate-pointed . . . . . 15. *S. submutica* Botsch. et Vved.
18. Calyx 16–18 mm long, attenuate at base; leaves oblong or elliptical, dissected into linear flexuous-incised segments . . . . . 12. *S. trautvetteri* Rgl.
- + Calyx 19–20 mm long, not attenuate at base; leaves ovate, pinnatisect, the segments elliptical or oblong, acute, toothed or subspatulate . . . . . 14. *S. komarovii* Pobed.
19. Leaves pinnatisect, with 5 or 6 pairs of narrow linear segments, the terminal segment scarcely differing from others; corolla yellowish-blue . . . . . 20.
- + Leaves pinnatisect with 2–4 pairs of elliptical-oblong or lanceolate segments, the terminal segment larger and broader than others; corolla purple, yellow or milky-white . . . . . 22.
20. Whole plant or only inflorescence covered with simple hairs; upper half of calyx covered inside with very short glandular hairs. . . . . 9. *S. scabiosifolia* Lam.

- 248 + Whole plant or only inflorescence and calyx covered with long simple as well as long-stipitate glandular black-headed hairs . . . . . 21.
21. Inflorescence, calyx outside and in upper half inside covered with black-headed glandular hairs; upper lip of calyx with subequal teeth; nutlets 4 mm in diameter, dark brown . . . . . 10. *S. adenostachya* Juz.
- + Whole plant covered with long simple as well as glandular hairs, these with either black or light-colored heads; upper half of calyx subglabrous inside, with scattered pale short-stipitate glands; middle tooth of upper calyx-lip broad, exceeding the lateral teeth, notched at its tip; nutlets 3 mm in diameter, black . . . . . 11. *S. demetrii* Juz.
22. Stem in upper part and in inflorescence, floral leaves and calyx covered with simple as well as short- and long-stipitate black-headed glandular hairs . . . . . 4. *S. pachystachya* Trautv.
- + Plants destitute of black-headed glandular hairs . . . . . 23.
23. Calyx 8–10 mm long; calyx densely glandular-hairy, the teeth of upper lip equal . . . . . 5. *S. alexandri* Pobed.
- + Calyx 12–20 mm long; calyx covered with simple hairs, the middle tooth of upper lip exceeding the lateral teeth . . . . . 24.
24. Calyx campanulate, 15–20 mm long, covered with long multicellular patent hairs intermixed with short antrorse hairs and few short-stipitate glands; middle tooth of upper calyx-lip broad, flat, rounded, mucronate, exceeding the small lateral teeth . . . . . 6. *S. garedji* Troitzki.
- + Calyx broadly campanulate, 12–15 mm long, covered on the nerves with short recurved hairs and sometimes with few long multicellular hairs, on the internerves with sparse short-stipitate glands: upper lip of calyx with 3 small teeth, the middle tooth slightly exceeding the lateral . . . . . 7. *S. rosifolia* Sm.
- 25 (1). Staminal connective somewhat shorter than the filament and apparently forming its extension; anterior anther-cells lacking, the anterior arm short, subulate, directed downwards along the filament; corolla-tube with a ring of hairs . . . . . 72.
- 249 + Filament shorter than the connective, at an angle to it; corolla-tube without a ring of hairs . . . . . 26.
26. Anterior arm of staminal connective longer than the posterior, somewhat enlarged at the end, not connected; differentiated sterile anther-cell absent; corolla-tube 3–3½ times as long as calyx; floral leaves, calyx and corolla scarlet . . . . . 72. *S. splendens* Ker.-Gawl.
- + Posterior arm of staminal connectives very long, anterior arm very short, terminating in sterile anther-cells, these scarious, rectangular, variously notched, anteriorly connected; corolla-tube short; floral leaves, calyx and corolla not scarlet . . . . . 27.
27. Calyx broadly campanulate; upper lip concave, deeply bisulcate, slightly accrescent (Section *Plethiosphace*) . . . . . 58.
- + Calyx tubular, conical-tubular, tubular-campanulate or campanulate; upper lip straight and scarcely altered in fruit, rarely strongly accrescent . . . . . 28.



28. Lateral teeth of upper calyx-lip asymmetrical; corolla small, with erect upper lip; floral leaves with linear stipules; annuals (Section Horminum) . . . . . 29.
- + Teeth of upper calyx-lip symmetrical, erect or scarcely connivent, the central tooth very small; floral leaves exstipulate; perennials . . . . . 31.
29. Terminal sterile leaves above inflorescence later, bright violet or pink; corolla tube exserted . . . . . 26. *S. horminum* L.
- + Terminal sterile leaves above inflorescence often undeveloped; inflorescence bearing flowers all the way up or sterile leaves small, green; corolla-tube included in calyx . . . . . 30.
30. Calyx covered on the ribs with long multicellular hairs (these with thickened lower joint), between the ribs with short appressed retrorse hairs; floral leaves subtending verticillasters and stem in inflorescence with similar vestiture . . . . . 27. *S. viridis* L.
- + Calyx, flowering leaves subtending verticillasters and stem in inflorescence covered with simple multicellular hairs and long-stipitate large-headed glands . . . . . 28. *S. intercedens* Pobed.
31. Calyx slightly or scarcely accrescent, 2-lipped less than half its length; upper lip of corolla usually longer than the lower, falcate, compressed laterally; perennials, very rarely subshrubs (Section Stenarrhena) . . . . . 32.
- 250 + Calyx strongly accrescent (about one-and-a-half times as long in fruit), 2-lipped to half its length; upper lip of corolla as long as or shorter than the lower lip, slightly curved; floral leaves very large, exceeding the flowers, pink; perennial plants . . . . . 56. *S. insignis* Kudr.
32. Corolla-tube gradually widening towards throat; nectaries absent; upper stamens always transformed into staminodes (Subsection Homalosphace) . . . . . 33.
- + Corolla-tube abruptly widening under throat; nectaries scalelike with glandular hairs on upper margin; staminodes mostly absent (Subsection Gongrosphace) . . . . . 41.
33. Teeth of upper calyx-lip equal or subequal . . . . . 34.
- + Middle tooth of upper calyx-lip much shorter than the lateral teeth . . . . . 37.
34. Calyx campanulate; shaggy plants, in inflorescence also with stipitate glands; corolla 8–12 mm long; middle lobe of lower corolla-lip broadly obovate, deeply concave . . . . . 29. *S. syriaca* L.
- + Calyx tubular or conical-tubular; plants covered with taeniate\* hairs and stipitate glands; corolla 2–3 cm long; middle lobe of lower corolla-lip obovate, slightly concave . . . . . 35.
35. Calyx tubular; calyx teeth and floral leaves terminating in a long slender soft spineless point; inflorescence axis densely covered with short-stipitate glands; margin of floral leaves and calyx nerves covered with scattered short 2–3-jointed hairs, the basal segment of these inflated; internerves of calyx with short-stipitate glands . . . . . 32. *S. macrosiphon* Boiss.

\* [Designates multicellular hairs with broad flat segments (Translator).]

- + Calyx conical-tubular; calyx teeth and floral leaves terminating in a short indurated spinous point; axis of inflorescence, floral leaves and calyx nerves covered with fine taeniate hairs intermixed with long-stipitate glands; internerves of calyx with sparse short-stipitate glands . . . . . 36.
36. Floral leaves covered beneath with stipitate glands; cauline leaves suborbicular, white-floccose; calyx copiously glandular-hairy . . . 31. *S. nachiczewanica* Pobed.
- + Floral leaves without stipitate glands; cauline leaves ovate or elliptical, with much sparser indument; calyx with fewer glandular hairs . . . 30. *S. spinosa* L.
37. Flowers subtended by linear ciliate bracts\* 5–6 mm long; indument including short thick-jointed hairs . . . . . 33. *S. compar* Trautv.
- + Flowers ebracteate; plants covered with fine soft implexed hairs, the calyx also with bristly hairs or else plants white-tomentose . . . . . 38.
38. Calyx tubular or tubular-campanulate, 16–20 mm long . . . . . 39.
- + Calyx campanulate, 6–10 mm long . . . . . 40.
39. Leaves ovate or broadly elliptical, 12–15 cm long, 5–10 cm broad, sparsely pubescent; plants 25–50 cm high . . . . . 35. *S. gontscharovii* Kudr.
- + Leaves elliptical or oblong-elliptical, (5) 7 (8) cm long, (1.5) 2.2 (3) cm broad, densely white-tomentose; plants 15–30 cm high. . . . 34. *S. zeravschanica* Rgl.
40. Plants 10–35 cm high; leaves white-tomentose beneath, greenish above, (2.5) 3 (18) cm long, (0.4) 1.2 (6) cm broad, with strongly erose-dentate margin, sometimes lobate; flowers 15–23 mm long, violet; nutlets trigonous-ellipsoid, 2.5 mm long . . . . . 36. *S. canescens* C. A. M.
- + Plants (7) 10 (22) cm high; leaves niveous-tomentose on both sides, (2) 3.5 (10) cm long, (0.4) 0.5 (1.5) cm broad, remotely dentate or subentire; flowers small, 14–17 mm long, blue; nutlets 2 mm long, trigonous-globose . . . . . 37. *S. daghestanica* Sosn.
- 41 (32). Leaves pinnate . . . . . 42.
- + Leaves simple . . . . . 43.
42. Verticillasters 1–3-flowered; floral leaves gradually acuminate; calyx green in fruit, the teeth subulately long-acuminate; flowers white (Turkmenia) . . . . . 53. *S. semilanata* Czerniak.
- + Verticillasters mostly 5–6-flowered, rarely all 2–3-flowered; floral leaves abruptly pointed; calyx-tube membranous, prominently ribbed (especially in fruit), the teeth short, subulate-pointed; flowers yellow (Caucasus) . . . . . 52. *S. ceratophylla* L.
43. Corolla small, 8–9 mm long; leaves predominantly radical; floral leaves half the length to length of calyx; staminodes absent . . . . . 54. *S. brachyantha* (Bordz.) Pobed.
- 252 + Corolla large, 1.2–3.5 cm long . . . . . 44.
44. Calyx, like the rest of the plant, heavily clothed with floccose white tomentum; inflorescence a pyramidal many-flowered panicle; flowers white. . . . . 44. *S. aethiopis* L.
- + Plants not flocculately white-tomentose and, if stem and leaves with such indument, calyx usually without it . . . . . 45.

\* [Although the terms bracts and bracteoles are used inconsistently, the author's terminology has been retained in English equivalents (Translator).]

45. Floral leaves scarious, large, exceeding calyx, sometimes longer than corolla, pink or white, with a green margin . . . . . 38. *S. sclarea* L.  
+ Floral leaves green or violet, shorter than calyx . . . . . 46.
46. Upper floral leaves soon deciduous . . . . . 44. *S. beckeri* Trautv.  
+ Upper floral leaves persistent . . . . . 47.
47. Indument containing taeniate or fine crisp hairs or long-stipitate glands . . 48.  
+ Indument containing short hairs inflated at base . . . . . 50.
48. Indument of lower part of stem containing glandular hairs; upper lip of corolla narrow, slightly falcate . . . . . 47. *S. xanthocheila* Boiss.  
+ Lower part of stem eglandular; upper lip of corolla broad, strongly falcate . . . . . 49.
49. Corolla ochroleucous, 2–2.5 cm long; verticillasters 1–2.5 cm apart; stem in inflorescence with long-stipitate glands . . . . . 45. *S. verbascifolia* M. B.  
+ Corolla violet, 15–17 mm long; verticillasters 1–1.5 cm apart; stem in inflorescence covered only with simple hairs; stem and calyx more copiously hairy than in the preceding species . . . . . 46. *S. andreji* Pobed.
50. Leaves rugose . . . . . 51.  
+ Leaves not rugose but slightly rugose at margin . . . . . 53.
51. Leaves small, 2.2 cm long, 1.2–1.8 cm broad; nutlets 2.5 mm long . . . . . 50. *S. prilipkoana* Grossh.  
+ Leaves large, 5–11 cm long, 2.5–7.5 cm broad . . . . . 52.
52. Stem leafy all the way up; corolla 14–19 mm long, the upper lip strongly curved; nutlets 2 mm long . . . . . 51. *S. fomirii* Grossh.  
+ Leaves largely confined to lower part of stem; corolla 24–27 mm long, the upper lip strongly curved or suberect; nutlets 3 mm long . . . . . 48. *S. limbata* C. A. M.
- 253 . . . . . 54.
53. Stem eglandular or glandular-hairy only in inflorescence . . . . . 54.  
+ Stem covered from base with short-stipitate glands . . . . . 56.
54. Leaves 5.5–10 cm long, 1.5–3 cm broad, rugose, finely arachnoid-pubescent . . . . . 55.  
+ Leaves much larger, 9–16 cm long, 5–7 cm broad, smooth, scarcely rugose at margin, subglabrous above or with scattered fascicled hairs, covered on the veins beneath with long fine hairs . . . . . 43. *S. karabachensis* Pobed.
55. Upper lip of calyx with 3 subdistant teeth; calyx covered with long taeniate hairs, these both eglandular and glandular; corolla 1.5–2 cm long, the upper lip narrow, the middle lobe of lower lip deeply concave; stem with stipitate glands in inflorescence . . . . . 41. *S. grossheimii* Sosn.  
+ Upper lip of calyx rounded, with 3 connivent teeth; calyx densely covered with short fine crisp hairs; corolla 2.5–3 cm long, the upper lip broad, the middle lobe of lower lip slightly concave, wider in relation to length as compared with the preceding species; stem eglandular in inflorescence . . . . . 42. *S. hajastana* Pobed.
56. Leaves subglabrous above, densely patent-hairy beneath . . . . . 49. *S. chloroleuca* Rech.



- + Leaves tomentose with long fine implexed hairs . . . . . 57.
57. Radical leaves oblong-lanceolate or elliptical, (7) 10 (15) cm long, (2.5) 5(6) cm broad; verticillasters 3–6 cm apart; corolla 2–2.5 cm long. . . . . 40. *S. linczewskii* Kudr.
- + Radical leaves broad-ovate, ovate or rhomboidal-oblong, (8) 11 (13) cm long, (3) 5.5 (8) cm broad; verticillasters 2.5–3 cm apart; corolla 2.5–3 cm long . . . . . 39. *S. kopetdaghensis* Kudr.
- 58 (27). Inflorescence nodding at summit; verticillasters on inflorescence axis and on branches crowded; nearly all leaves radical, broad-ovate; cauline leaves but one pair, sessile . . . . . 68. *S. nutans* L.
- + Inflorescence erect at summit; verticillasters on inflorescence axis and on branches more or less distant . . . . . 59.
- 254 59. Stamens and style twice to three times as long as corolla; upper lip of corolla narrow, nearly straight or slightly curved; corolla yellow . . . . . 60.
- + Stamens and style exerted one-third to one-half the length of upper lip of corolla or stamens concealed under the lip; corolla violet or blue . . . . . 61.
60. Calyx covered with long fine strict multicellular hairs; upper lip of corolla with long-stipitate glands on the back . . . . . 69. *S. austriaca* Jacq.
- + Calyx covered with fine multicellular hairs intermixed with soft taeniate hairs; upper lip of corolla covered on the back with very short shaggy hairs . . . . . 70. *S. armeniaca* (Bordz.) Grossh.
61. Flowers 8–9 mm long; leaves broad-elliptical, deeply sinuate 71. *S. verbenaca* L.
- + Flowers 9–30 mm long; leaves ovate, ovate-oblong or oblong, crenate . . . . . 62.
62. Floral leaves exceeding the calyx, violet, imbricate in bud . . . . . 63.
- + Floral leaves as long as or shorter than the calyx, green, nonimbricate in bud . . . . . 65.
63. Calyx covered on nerves with very short appressed hairs; corolla 8–10 mm long; middle lobe of lower lip of corolla appressed to calyx . . . . . 64. *S. nemorosa* L.
- + Calyx covered with longer hairs; corolla 8–16 mm long; middle lobe of lower lip of corolla not appressed to calyx . . . . . 64.
64. Floral leaves orbicular, short-acuminate, usually exceeding the calyx, violet, persistent in fruit, upright; lower stem internodes covered with relatively short patent hairs . . . . . 65. *S. tesquicola* Klok. et Pobed.
- + Floral leaves lance-ovate, long-acuminate, usually shorter than calyx, green or the upper faintly violet-tinged, recurved in fruit and appressed to inflorescence axis, sometimes deciduous; lower stem internodes densely covered with relatively long hairs . . . . . 66. *S. deserta* Schang.
65. Calyx falling off after seed ripening . . . . . 67. *S. fugax* Pobed.
- + Calyx persistent . . . . . 66.
66. Inflorescence with very long thick divaricate strict branches exceeding the axis, or simple and then composed of 8–40 verticillasters and all leaves radical; leaves oblong, more rarely ovate-oblong, obtuse . . . . . 67.
- 255 + Inflorescence simple or with branches shorter than the axis, composed of 5–20 verticillasters; leaves acute, more rarely ovate-oblong, obtuse . . . . . 69.
67. Leaves predominantly radical; cauline leaves 1 or 2 pairs, small, sessile, broadly lanceolate; inflorescence of 8–20 verticillasters . . . . . 63. *S. sibthorpii* Sm.

- + Leaves distributed along the stem; inflorescence of 12–40 verticillasters . . . . . 68.
68. Floral leaves rounded, short-acuminate; verticillasters on axis of inflorescence 20–40, distant; indument of stem and calyx including long-stipitate large-headed glands . . . . . 61. *S. virgata* Jacq.
- + Floral leaves lance-ovate, long-acuminate; verticillasters on axis of inflorescence 12–20, the upper approximate, the lower distant; stem and calyx eglandular. . . . . 62. *S. turcomanica* Pobed.
69. Base of stem glabrous or with very short scattered hairs . . . . . 59. *S. stepposa* Schost.
- + Base of stem with long implexed taeniate hairs and few long-stipitate glands . . . . . 70.
70. Upper lip of corolla scarcely curved, narrow . . . . . 60. *S. kuznetzovii* Sosn.
- + Upper lip of calyx hooded, broad . . . . . 71.
71. Hermaphrodite flowers 2.5–3 cm long, violet; leaves ovate-oblong or ovate . . . . . 57. *S. pratensis* L.
- + Hermaphrodite flowers 1–2 cm long, dark violet; leaves oblong or ovate-oblong . . . . . 58. *S. dumetorum* Andr.
- 72 (25). Upper lip of corolla deeply cleft; lower lip 3-lobed, the lobes subequal; flowers solitary in leaf axils; calyx falling off at maturity; subshrubs with densely pubescent white leaves . . . . . 75. *S. baldshuanica* Lipsky.
- + Upper lip of corolla entire, arched, spreading, abruptly narrowed at base; lateral lobes of lower lip much smaller than the bilobulate middle lobe; perennials with green leaves . . . . . 73.
73. Leaves thin, with 1 or 2 pairs of small opposite segments at base; verticillasters 20–40-flowered; calyx with oblique throat; upper lip of calyx exceeding the lower, densely covered with long multicellular hairs; staminodes absent . . . . . 73. *S. verticillata* L.
- 256 + Basal leaf segments absent or obsolescent; verticillasters 15–25-flowered; calyx with straight throat and subequal lips, covered with short hairs on the nerves and with short-stipitate glands between them; staminodes present . . . . . 74. *S. amasiaca* Fr. et Borum.

Subgenus 1. *Eusalvia* Pobed. — *Salvia* L. Sp. pl. (1753) 23, p. p.; Moench, Meth. pl. 372. — *Salvia* (subgen.) Benth. in Benth. a. Hook. f. Gen. II (1876) 1195, p. p.; Briq. in Pflanzenfam. IV, 3a u. 3b (1897) 272. — Calyx campanulate or tubular-campanulate, unchanged or slightly enlarged in fruit; upper lip 3-toothed, the teeth short; corolla-tube long, mostly much exserted, with a ring of hairs in lower third, rarely ringless or pubescent all over inside (Section *Drymospace*), with a wide throat; upper lip of corolla as long as or shorter than the lower, erect, rarely slightly curved; lower lip 3-lobed, the middle lobe broad, convex, pendulous, the lateral lobes shorter, semiorbicular, recurved; filaments as long as or longer than the arcuately deflexed staminal connective and jointed to it at the middle (the two arms thus being equal) or somewhat nearer to the anterior anther-cell and then the posterior arm longer; all anther-cells fertile or the anterior sterile (Section *Drymospace*), the anterior much smaller

or modified, flabelliform, thickened at the broad margin, with a small amount of pollen, rarely sterile; upper stamens always transformed into staminodes.

Subshrubs or rarely herbs, with simple or pinnate leaves and many-flowered verticillasters.

Type species of the subgenus *S. cretica* L.

Section 1. **Eusphace** Benth. in Hook. Bot. Misc. III (1832–1836) 372 in adnot.; Benth. Lab. Gen. et sp. 194; Ldb. Fl. Ross. III, 358; Boiss. Fl. or. IV, 591; Briq. Pflanzenfam. IV, 3a, 3b, 272. — Calyx campanulate or broadly campanulate, not inflated; upper lip 3-toothed, the teeth distinct; upper lip of corolla as long as the lower, erect, the margins not revolute; arms of staminal connective equal, rarely the posterior slightly longer; both anther cells fertile; verticillasters (2) 6 (10)-flowered; subshrubs, rarely herbs, with opposite branches and simple or pinnate leaves.

257 Series 1. *Officinales* Pobed. — Leaves petiolate, the blade simple, undivided; verticillasters 6–10-flowered; flowers on pedicels 3–7 mm long.

1. *S. officinalis* L. Sp. pl. (1753) 23; Etling, Comment. botan.-medica de Salvia, 16; Georgi, Besch. d. Russ. R. III, 4, 657; Benth. Lab. Gen. et sp. 208 et in DC. Prodr. XII, 264; Shmal'g. Fl. II, 316. — Ic.: Kom. Sbor., sushka i razved. lekarstv. rast. Ross. Fig. 31; Rchb. Ic. Fl. Germ. XVIII, tab. 1245. — Exs.: Fl. Hung. exs. No. 253; Pl. Hercegov. exs. No. 131; Fl. Gall. et Germ. exs. No. 2338; Rchb. Fl. Germ. exs. No. 2284.

Subshrub, 25–50 cm high; root woody; stem erect, branched, several times as long as inflorescence, with short leafy shoots at base, with short crisp hairs and evenly distributed leaves; leaves of vegetative and flowering shoots oblong, 3.5–8 cm long, 0.8–1.5 (4) cm broad, subobtusely to acute, cuneate or rounded at base, crenulate, rugose, densely covered on the convexities above and all over beneath with fine multicellular hairs, white-pubescent when young, the lower and middle on crisp-puberulent petiole much shorter than blade, the upper sessile; basal lobes, if present, very small, elliptical, long-attenuate to rounded or acute apex; lower floral leaves sessile, lanceolate, resembling the cauline but much smaller, upper floral leaves ovate to suborbicular, short-acuminate, scarious or green, densely crisp-pubescent outside, deciduous at anthers; inflorescence simple or branched, with 6 or 7 verticillasters, these 10-flowered, 1–2 cm apart; flowers on crisp-pubescent pedicels 3–6 mm long, mostly with 2 small lanceolate pubescent bracteoles; calyx 9–10 mm long, 2-lipped nearly to the middle, covered outside with short crisp hairs especially on nerves and at margin, with numerous sessile glands between the nerves; upper lip of calyx as long as the lower, the lateral teeth ovate, long-acuminate, the middle tooth half the length, broadly triangular, terminating in a very short point; lower lip more deeply bidentate, the teeth lanceolate, long-acuminate; corolla violet, 2½ times as long as calyx, slightly crisp-pubescent;



upper lip erect, slightly emarginate; lower lip longer than the upper, the lateral lobes elliptical, recurved, the middle lobe longer, broadly obovate, notched, convex, drooping; stamens concealed under the upper lip; filaments attached to staminal connective nearer the anterior anther cells, these somewhat reduced, coherent, the anterior anther-  
258 cells about as long as the posterior arm of connective; upper stamens reduced to short apically enlarged staminodes; style slightly exserted; lobes of stigma unequal; nutlets subglobose, 2.5 mm in diameter, brown, with darker stripes. June—July.

In gardens, cultivated or naturalized. — European part: M. Dnp., L. V.; Caucasus: throughout. **Gen. distr.:** Centr. Eur., Med., Bal.-As. Min. Described from S. Europe. Type in London.

**Note.** A West European species. It does not occur in the U.S.S.R. in wild condition. The few herbarium specimens from U.S.S.R. territory represent plants cultivated or naturalized in gardens.

**Economic importance.** Grown since antiquity for its medicinal properties. The leaves contain up to 2.5% essential oil; about 15% of this consists of cineole, thujone and terpene. The recorded output of essential oil from stem tips with leaves and flowers is 0.46% for Crimea, and 0.32% for Sukhumi; it has been found that the yield of oil increases before flowering. The foliage contains tannin. A leaf infusion is used to this day for treatment of common cold and as gargle for throat complaints (angina, tonsillitis). As an ornamental plant, *S. officinalis* is used for garden paths and beds.

2. *S. grandiflora* Etling. Salv. 2 (1777) 17; M. B. Fl. taur-cauc. I, 19; Benth. Lab. Gen. et sp. 209; Ldb. Fl. Ross. III, 779, p. p. (quoad plant. Taur.); Benth. in DC. Prodr. XII, 264; Boiss. Fl. or. IV, 593; Shmal'g. Fl. II, 316; Lipskii, Fl. Kavk. 419; Grossg. Fl. Kavk. III, 317. — *S. officinalis* Georgi, Besch. d. Russ. R. (1800) 657, p. p. non L. — **lc.:** Jacq. Ecl. Pl. I, tab. 36. — **Exs.:** Dörfler, Herb. norm. No. 3443. —
- 259 Subshrub, 30–80 cm high; stems several, ascending to erect, simple, with vegetative shoots at base, uniformly leafy, covered from base with fine crisp multicellular hairs, these interspersed in inflorescence with mostly short-stipitate large-headed orange glands; basal leaves ovate or ovate-oblong, (3.5) 9 (12) cm long, (1.8) 3.5 (5) cm broad, subobtusate to acute, rounded or subcordate at base, crenulate, rugose, the upper side with fine multicellular hairs between the veins, the lower side with similar hairs mainly at angles of veins and with numerous sessile glands between the veins; petioles 3.5–4 cm long, covered with fine crisp multicellular hairs; middle and upper leaves gradually smaller toward summit, short-petioled; lower floral leaves lanceolate, sessile, acute, attenuate at apex, the lower side with indument as on cauline leaves, the upper side subglabrous; upper floral leaves broad-ovate, long-acuminate but not subulate-pointed, sessile, shorter than calyx, glabrous above, hairy beneath like other leaves, persistent in fruit; inflorescence simple or with two short branches at base, composed of 6 or 7 verticillasters, these 6–8-flowered, 1–1.5 cm apart, only the lowest at a distance of about 5 cm; pedicels varying in length from 4.5 to 7 mm, crisp-puberulent, with a pair of small linear bracts at base, these white, covered with long fine multicellular and short crisp hairs; calyx 12–17 mm long, with subequal lips, sparsely covered with long multicellular hairs (the lower segments broad and flat), subsessile

large-headed orange or reddish glands, and some small-headed colorless glands; teeth of upper lip very short, the lateral triangular, slightly exceeding the broad half-rounded middle tooth; lower lip deeply 2-toothed; all calyx-teeth shortly subulate-pointed; corolla blue, one-and-a-half times to twice as long as calyx, covered with short and long crisp hairs; upper lip also with short-stipitate glands, shorter than to about as long as the lower, emarginate; lateral lobes of lower lip elliptical, oblong, revolute, the middle lobe longer, broadly obovate, slightly notched, convex, drooping; stamens concealed under the upper lip of corolla, the posterior arm slightly longer than the anterior, the posterior anther-locules shorter than the adjoining arm of connective, the anterior anther-locules half the length, fertile; upper stamens transformed into staminodes, round-dilated at summit; style barely exerted; lobes of stigma unequal; nuts globose, 2.5 mm in diameter, dark brown, smooth. June–July.

Calcareous steppe slopes, wood opening. — European part: Crim.; Caucasus: W. Transc. (Novorossiisk). Endemic. Described from the Crimea. Type unknown.

Note. The indication of Schmalhausen (op. cit.) concerning the occurrence of this species in Asia Minor and in the Balkan Peninsula is manifestly wrong and probably refers to other species. Grossheim (Opred. rast. Kavkaza, 1950) mentions this plant for Cherkesia, but we have not seen any herbarium specimens from that region. For the Caucasus, this species is reliably known only from Novorossiisk. Ledeboer's erroneous reports for the rivers Ural and Irtysh, based on plants collected by Gmelin and Pallas are evidently due to mixed-up labels.

**Economic importance.** Steam distillation of dry plants collected from Nikita botanical garden yielded 0.27% essential oil. The yellowish oil smells strongly of camphor (Nilov and Vil'yams in Zap. Gos. Nikitsk. bot sada, IX, 1, 1929).

Series 2. *Trigonocalyx* Pobed. — Leaves petiolate, not dissected; verticillasters 2-flowered; pedicels 20–35 mm long.

3. *S. trigonocalyx* Woron. in Vestn. Tifl. bot. sada, XXII (1912) 10; Grossg. Fl. Kavk. III, 317.

Subshrubs, 40–75 cm high; stems with numerous decumbent densely leafy sterile shoots at base and with two pairs of long strict branches nearly from base; basal leaves 2–3 pairs; stem otherwise leafless, sparsely covered with short patent hairs on the two lowest internodes, glabrous above; radical leaves elliptical, 5–5.5 cm long, 1.5–2 cm broad, obtuse, rounded or cuneate at base, crenulate, strongly rugose, sparsely covered between the veins above and densely on the veins beneath with short fine appressed white hairs; petioles as long as or longer than blade, covered with long strict multicellular and short patent hairs; lower floral leaves wanting or soon deciduous (?), the upper sometimes persistent only at the buds, very small, elliptical, obtuse, reddish, white-ciliate; inflorescence simple or with 1–2 pairs of strict branches, racemose; verticillasters 2–4-flowered, 4–8 cm apart; flowers solitary or paired in the axils of floral leaves; pedicels 2–3.5 cm long, with two small oblong obtuse ciliate bracteoles at base;

calyx 12–15 mm long, accrescent, to 17–18 mm in fruit, 3-ribbed, covered outside with long-stipitate glands; corolla 2–2½ times as long as calyx, covered outside with short-stipitate and sessile glands; upper lip broad, obtuse, deeply notched; lower lip longer, the lateral lobes broad, semiorbicular, reflexed, the middle lobe longer, broadly obovate, emarginate, deflexed; stamens exserted, the connective arms subequal, the posterior anther-locules nearly equaling the adjoining arm, the anterior locules one-fourth to one-third the length of the posterior, fertile, connate; upper stamens reduced to staminodes, with very broad, nearly rounded extremity; style exserted, the lobes of stigma subequal; nutlets ellipsoid, 4–4.5 mm long, brown, obscurely fine-tubercled; receptacle convex; disk-lobes large, triangular, appressed between the nutlets. July.

Marl slopes of mountains. — Not found in the U.S.S.R., occurring in the adjoining Artvin district of Turkey. **Gen. distr.:** Arm.-Kurd. Described from Artvin (Gorgotokhan).

**Note.** This species undoubtedly belongs to the section *Eusphace*, but it occupies a distinct position in not being closely related to *S. officinalis* and *S. grandiflora*.

Series 3. *Pachystachyae* Pobed. — Leaves pinnatisect, with 2–4 pairs of elliptical, oblong or lanceolate segments, the terminal segment slightly larger than the rest; upper lip of calyx longer than the lower, 3-toothed, the middle tooth longer than the obsolescent lateral teeth or more rarely all teeth equal.

4. *S. pachystachya* Trautv. in Bull. Soc. Nat. Mosc. II (1868) 462; Tr. Bot. sada, II, 2, 577 and IX, 1, 95; Grossg. Fl. Kavk. III, 317. — *S. caespitosa* Boiss. Fl. or. IV (1879) 599, p. p. (quoad plant. Armen. Rossicae); Lipsk. Fl. Kavk. 419. — *S. caespitosa* Montb. et Auch. ssp. *pachystachya* Bordz. in Zap. Kievsk. obshch. estestv. XXV (1915) 110. — *S. michajlowskyi* D. Sosn. in Vestn. Tifl. bot. sada, 27 (1913) 8. — Exs.: Herb. Fl. Cauc. No.238.

Subshrub, 20–35 cm high; stems numerous, erect or ascending, simple, covered from base with short recurved appressed hairs, in inflorescence also with profuse long-stipitate glands, the heads of these at length turning black; radical leaves and those on sterile shoots congested, imparipinnate, the terminal segment short-petioluled, (2.5) 3.5 (4) cm long, (0.5) 0.7 (1.1) cm broad, oblong-elliptical, the lateral segments 2–3 pairs, smaller and narrower, usually sessile, all segments cuneate, acute, rarely subobtuse, serrate, rugose, densely appressed-puberulent on both sides, in lower leaves 262 with subsessile glands; petioles about as long as or slightly shorter than blade, strongly dilated toward base, amplexicaul, winged, patent-ciliate; cauline leaves smaller, with shorter petiole; floral leaves ovate-lanceolate, exceeding calyx, simple, long-attenuate toward apex, entire, sessile or short-petioled, covered on both sides with long fine appressed hairs and long-stipitate glands, these at length turning black; bracts elliptical, acute, cuneately narrowed at base, shorter than calyx, with indument as on foliar leaves; inflorescence simple; verticillasters 6–8-flowered, 1.5–2 cm apart in flower, 2–5 cm apart in fruit; pedicels 2–3 mm long; calyx 11–15 mm long, 2-lipped,



to one-fourth in flower, to one-third in fruit, scarcely accrescent, green or faintly violet-tinged, prominently 14-nerved, covered on the teeth inside with short antrorse hairs, outside mainly on the nerves with long fine multicellular hairs, these intermixed with long- and short-stipitate finally black-headed glands; upper lip of calyx longer, 3-toothed, the lateral teeth obsolescent, the middle tooth much longer, triangular; lower lip with 2 longer ovate teeth, all teeth terminating in a short point; corolla milky-white, about three times length of calyx, crisp-puberulent outside; upper lip erect, notched; lower lip with suborbicular reflexed lateral lobes and broad reniform middle lobe; arms of staminal connective subequal, the posterior anther-locules about as long as the adjoining arm, covered with long fine implexed hairs, the anterior locules one-third to one-half the length of the posterior, anteriorly connate; style prominently exerted; lobes of stigma unequal; nutlets globose, 3 mm in diameter, dark brown, smooth. June–July.

Stony and calcareous slopes. — Caucasus: S. Transc. Gen. distr.: Arm.-Kurd. Described from Alagez (Aragats). Type in Leningrad.

Note. This species was identified by Trautvetter with *S. suffruticosa*; however, it differs from it in the following characters: stem covered with short appressed (not long patent) hairs; leaves with dense indument (not subglabrous); upper lip of calyx with obsolescent lateral teeth (not conspicuously 3-toothed); calyx-teeth short-pointed (not long-pointed). It is in fact much more closely related to *S. caespitosa* and Boissier erroneously considered *S. pachystachya* to be synonymous with it. *S. pachystachya* differs, however, in its stem being glandular-pubescent (not glabrous) in inflorescence; radical, cauline and floral leaves as well as calyx with more copious indument; calyx with long-stipitate glands that finally turn black (not short-stipitate, thick-headed); the plant as a whole much larger.

5. *S. alexandri* Pobed. sp. n. in Addenda XX, 653. — *S. suffruticosa* Grossh. in Fl. Kavk. III (1932) 318, non Montbr. et Auch. (1836).

Subshrub; stem branched, woody in lower part, covered with rimulose bark; an-  
notinous shoots green, simple or branched, covered with very short appressed thick-  
based hairs and very long scattered multicellular hairs, the lower joints of these broad  
and flat; inflorescence axis with short-stipitate glands; radical leaves unknown; cauline  
leaves imparipinnate, with 2 pairs of segments, these elliptical, 4–5.5 cm long, 1.2–  
1.7 cm broad, cuneate at base, acute, sharply dentate, decurrent to petiolule 0.6–1 cm  
long, hairy on both sides, the hairs short, thickened at base, distally incurved, the  
terminal segment slightly larger; petiole 0.6–1.2 cm long, winged, with very long  
sparse white cilia; rameal leaves much smaller; lower floral leaves broad-ovate or  
orbicular, mucronate, hairy beneath like cauline leaves, subglabrous above, long-white-  
ciliate at margin, half the length of calyx; upper floral leaves covered with short-stipitate  
glands; inflorescence simple, with 7 verticillasters, these 6–10-flowered, 2–4 cm apart,  
the terminal abortive; pedicels 3–4 mm long, appressed-puberulent, mostly with a pair  
of small green glandular-pubescent bracteoles at base; calyx broadly campanulate,  
8–10 mm long, with whitish tube and green nerves and teeth, cleft about halfway to  
base, covered on nerves with long multicellular hairs (the broad flat joints not dis-  
posed in one plane), densely covered between the nerves (especially in upper part)

with short-stipitate glands; upper lip of calyx semirounded-ovate, with 3 very short connivent teeth; lower lip longer than the upper, with 2 longer ovate teeth; all calyx-teeth subulate-pointed; corolla yellow (?), three times length of calyx; corolla-tube short, covered inside nearly to throat with hairs borne on reddish tubercles, with a dense ring of hairs in lower third descending opposite the lower lip, outside with  
264 short-stipitate often black-headed glands and scattered long taeniate hairs; lateral lobes of lower lip large, broad, elliptical, reflexed, the middle lobe very broad, transversely elliptical, strongly convex, drooping; stamens concealed under upper lip of corolla; lobes of stigma unequal; nutlets unknown. June.

Clayey-stony slopes. — Caucasus: S. Transc. Endemic. Described from Nakhi-chevan' ASSR (Ilanlu-Dag). Type in Leningrad.

Note. A species resembling *S. suffruticosa* Montbr. et Auch., described from Taurus, and up till now identified with it. It differs, however, from *S. suffruticosa* in its broadly campanulate calyx, 8–10 mm long (not elongate-campanulate, 15–17 mm long), distant verticillasters (not approximate), stem covered with short hairs (not long and strict), and in other characters.

*S. russegeri* Fenzl, reported by Grossheim in "Flora Kavkaza" (III, 318) for the Artvin area and belonging to the same series, was described from Asia Minor. We do not include it in the Flora of the U.S.S.R. as it has not so far been found in the Caucasus. The identity of the Artvin plant with the genuine *S. russegeri* is rather doubtful.

6. *S. garedji* Troitzki in Izv. Glavn. bot. sada SSSR, SSVII (1928) 623; Grossg. Fl. Kavk. III, 316. — Ic.: Troitskii, op. cit. 625. — Exs.: Pl. or. exs. No. 217.

Subshrub, 20–40 cm high; stems branched from base, erect or slightly ascending, densely leafy, covered with scattered patent multicellular hairs intermixed with short upcurved hairs and numerous short-stipitate glands; inflorescence axis with similar but denser indument; cauline leaves imparipinnatisect, the lateral segments 2–4 pairs, subequal, elliptical-oblong or lanceolate, 1.5–2 cm long, 0.4–0.5 cm broad, gradually narrowed at base to a short petiole, obtuse, coarsely blunt-toothed or irregularly double-dentate, densely covered beneath with long falcate hairs and scattered pale-yellow subtranslucent sessile glands, with sparser and shorter hairs above, the terminal segment slightly larger and broader; radical leaves smaller, the segments wider, to  
265 broad-elliptical; lower floral leaves resembling the cauline but smaller, with fewer segments, exceeding the calyx; middle floral leaves oblong-lanceolate, undissected or tri-sect, equaling the calyx; upper floral leaves simple, lanceolate, long-attenuate at apex, shorter than calyx, green or colored, pubescent; inflorescence simple; verticillasters 5–6, spaced 1.5–2.5 cm apart, 8-flowered; pedicels 3–5 mm long; calyx 15–20 mm long at anthesis, cleft one-third its length, enlarged in fruit and then cleft halfway to base with dark-purple nerves and margin, densely covered on the nerves with long multicellular upcurved hairs (intermixed with shorter ones), and few short-stipitate glands; upper lip longer than the lower, the lateral teeth obsolescent, the middle tooth much longer, broad, flat, rounded, mucronate; lower lip one-and-a-third times as long as calyx [sic], with 2 ovate-lanceolate acute teeth; corolla bright purple, 30–35 cm long,

crisp-pubescent outside and covered with sessile glands; upper lip erect, deeply notched; middle lobe of lower lip broad, transversely elliptical, emarginate, the lateral lobes suborbicular, reflexed; filaments about as long as or slightly longer than staminal connective, the upper arm of connective longer than the lower, terminating in small fertile anther-cells; nutlets ellipsoid, 4 mm long, dark brown, almost smooth. June—July.

Dry slopes, on sandstone outcrops. — Caucasus: E. Transc. Endemic. Described from Georgia. Type in Leningrad.

7. *S. rosifolia* Sm. Ic. Ined. I (1789) 5; Benth. Lab. Gen. et sp. 212 et in DC. Prodr. XII, 268; Boiss. Fl. or. IV, 596; Grossg. Fl. Kavk. III, 318. — *Sclarea orientalis* Mill. Gard. Dict. (1768) No. 10. — Ic.: Sm. l. c. tab. 5.

Subshrub, 20–30 cm high; root vertical, long, woody, dark brown; stems several, simply or doubly branched from base, erect or ascending, densely leafy, the lower and middle internodes densely covered with long taeniate hairs and very short retroflexed hairs; inflorescence axis with few or no long hairs; cauline leaves imparipinnate, the lateral segments 2–3 pairs, subequal, elliptical or oblong, 2–3 cm long, 0.7–1.3 cm broad, subobtuse to acute, coarsely and bluntly dentate, short-petioled, glabrous above or with scattered short reflexed hairs, on both sides with numerous sessile pale-yellow glands, the terminal segment longer and broader; lower floral leaves resembling the cauline but much smaller, exceeding the calyx, the middle oblong, acute, unevenly and bluntly dentate, pubescent, the upper entire, glabrous above, ciliate, sessile, shorter than calyx, often suffused with red or violet; inflorescence simple; verticillasters 2–4, 1.5–3 cm apart, 2–5-flowered; pedicels unequal, 3–5 mm long, densely short-pubescent; calyx 12–15 mm long, cleft about halfway to base, covered with short recurved hairs on the nerves, with sessile glands; upper lip erect, longer than the lower, deeply notched; middle lobe of lower lip transversely elliptical, narrowed toward base, notched at apex, the lateral lobes semiorbicular, reflexed; upper arm of staminal connective incurved, equaling or slightly exceeding the anthers and longer than the lower incurved arm, this terminating in a small, modified but fertile anther-locule; nutlets subglobose, 2 mm in diameter, dark brown, smooth. May—July.

Dry slopes. — Not found in the U.S.S.R. but known from the border areas of Artvin and Kars. Gen. distr.: Arm.-Kurd. Described from Armenia. Type in London.

Series 4. *Ringentes* Pobed. — All leaves radical, pinnate, with 2 or 3 pairs of small elliptical segments, the terminal segment 2–3 times as long; lower lip of calyx exceeding the upper lip, with 3 equal teeth.

8. *S. ringens* Sibth. et Sm. Fl. Gr. I (1806) 14; Benth. Lab. Gen. et sp. 212; Benth. in DC. Prodr. XII, 266; Boiss. Fl. or. IV, 600; Lipskii, Fl. Kavk. 419. — *S. ringens* Sibth. et Sm. var. *pontica* Lipsky in Zap. Kievsk. obshch. estestv. XI (1891) 55 and in Tr. Bot. sada, 325; Shmal'g. Fl. II, 317; Grossg. Fl. Kavk. III, 318. — *S. radozytskii* Fisch. et Schyich. in Zhurn. sadov. No. 3 (1843) 47 (nomen



nudum). — Ic.: Sibth. et Sm. l. c. tab. 18; Rgl. in Gartenfl. tab. 59. — Exs.: Herb. Fl. Cauc. No. 239; Orph. Fl. Gr. No. 1605.

- 267 Perennial, 25–60 cm high; stem solitary, erect, simple, leafless or with 1, rarely 2 pairs of strongly modified leaves, glabrous from base or more rarely 2 lowest internodes covered with short appressed hairs, the lower inflorescence nodes glabrous or the whole inflorescence-axis covered with short crisp hairs intermixed with short-stipitate black-headed glands; radical leaves (7) 8 (11) cm long, (5) 6 (7) cm broad, pinnatisect, rugose, the terminal segment elliptical, (5.5) 9 (12) cm long, (2.5) 5 (7.5) cm broad, obtuse, rounded at base, the lateral segments 2–3 pairs, elliptical, shorter and narrower, the upper side slightly pubescent mainly between the veins, the lower side densely covered on the veins with fine multicellular hairs; petioles longer than blade, finely long-ciliate; cauline leaves absent or represented by a single pair, small, ovate or lanceolate, simple, obtuse, rounded at base, entire, with indument as on radical leaves, sometimes resembling radical leaves but smaller; floral leaves ovate, half the length of petiole, acuminate, sessile, scarious, glabrous on both sides, with long white cilia at base or covered beneath with glandular black-headed hairs, soon deciduous; inflorescence simple or branched, the branches strict, not reaching the summit of stem; verticillasters 5–10, distant (especially the lower), 4–6-flowered; pedicels unequal (the middle in each semivertical longer than the lateral), 7–10 mm long, covered with fine multicellular retrorse white hairs, with a pair of bracts at base, these puberulent beneath or glabrous on both sides, with ciliate margin; calyx 12 mm long, covered outside with long-stipitate black-headed glands, inside in upper half with short pale-headed glands; upper lip semiorbicular, with 3 minute equal connivent teeth; lower lip exceeding the upper, with 2 triangular teeth one-quarter the length of calyx; corolla bright blue, 3.5–4.5 cm long, tube long, dilated at throat, curved in lower half; upper lip erect, emarginate, covered outside with short-stipitate glands (these with light-colored or black heads); lower lip longer, the lateral lobes semiorbicular, reflexed, the middle lobe twice as long, suborbicular, narrowed toward base, notched at apex, reflexed; stamens slightly exserted; filaments as long as connective, the anterior arm half the length of the posterior, both anther-locules fertile, the anterior locules short, reduced; upper stamens represented by well developed staminodes; style prominently exserted; lobes of stigma unequal; nutlets trigonous-ellipsoid, hemispherically bulging on the back, 3.5 mm long, dark brown, punctulate-tubercled. May–September.

Calcareous stony slopes. — Caucasus: Cisc., W. Transc. Gen. distr.: Bal.-As. Min. (Balkan Peninsula). Described from Greece. Type in Oxford.

Note. Caucasian specimens differ from the Balkan in having larger flowers; teeth of upper lip of calyx more equal or the middle tooth slightly shorter (not much shorter) than the lateral teeth; calyx more densely pubescent; leaves covered with longer hairs and hence their underside whitish. All these characteristics are not, however, sufficiently definite or constant, and therefore Lipsky, who had at first separated the Caucasian sage as var. *pontica*, later refrained from retaining it even in the rank of a distinct form.

Series 5. *Scabiosifoliae* Pobed. — Leaves pinnatisect, with 5 or 6 pairs of narrow linear segments, the terminal segment scarcely different; upper lip of calyx slightly longer than the lower, with 3 subequal teeth; flowers with elliptical bracteoles.

9. *S. scabiosifolia* Lam. Journ. Hist. Nat. Par. II (1792) 44, tab. 27; Benth. Lab. Gen. et sp. 213; Ldb. Fl. Ross. IV, 600; Benth. in DC. Prodr. XII, 270; Shmal'g. Fl. II, 316. — *S. taurica* Habl. Fiz. op. Kr. obl. (1785) 207. — *S. hablitziiana* Pall. Tabl. Phys.-top. Taur. (1795) 44; Willd. Sp. pl. 129; M. B. Fl. taur.-cauc. I, 19; Stev. Verz. Taur. Halb. Pfl. 278. — *S. pinnifolia* Pall. l. c. 44. — Ic.: Bot. Mag. XXXV, tab. 1429 and LXXXVI, tab. 5209.

Subshrub, 30–50 cm high; root woody, stout, fuscous; stems numerous, simple or branched at base, erect, woody at base, densely leafy, the lower internodes covered with very long fine multicellular strict hairs intermixed with very short appressed antrorse hairs; long hairs sparse on upper internodes, often absent in inflorescence or confined to nodes, multicellular hairs much shorter in inflorescence than on lower internodes; leaves short-petioled, elliptical in outline, pinnatisect, 5–8.5 cm long and 2–3 cm broad, imparipinnate, the lateral segments 5–6 pairs, linear, (12) 20 (40) mm long, (1) 2 (3) mm broad, acute, covered on both sides (more densely beneath) with short appressed antrorse hairs, the terminal segment scarcely broader; petiole and leaf rachis covered with long multicellular as well as short hairs; floral leaves shorter than 269 calyx, ovate, the lower long-attenuate at apex (the pointed part being longer than the rest of the blade), the upper short-acuminate, all sessile, subglabrous above, densely covered beneath with short appressed hairs, the margin finely long-ciliate; inflorescences terminal, rather compact; verticillasters 5–11, approximate, becoming distant in fruit, 6–10-flowered; pedicels short, erect, densely white-pubescent in fruit; bracteoles elliptical, densely long-pubescent; calyx slightly enlarged in fruit, 11–15 mm long, prominently 12–13-ribbed, covered outside with short appressed hairs or with long multicellular hairs on the ribs and short-stipitate glands between them, inside in upper part with very small stipitate glands; upper lip with 3 very short equal teeth, the lower lip slightly shorter, with 2 broad triangular teeth; corolla 2.5–3 cm long, whitish, with bluish markings; tube short, slightly exserted; upper lip erect, slightly emarginate, shorter than the lower, covered outside with long fine multicellular hairs and short-stipitate glands; lower lip with semiorbicular reflexed lateral lobes, the middle lobe much longer, broadly obovate, drooping, 9 cm broad [sic]; stamens concealed under upper lip; filaments about the length of staminal connective, the anterior sterile locules connate; style barely exserted; lobes of stigma subequal; nutlets globose, 3 mm in diameter, dark brown, punctulate-tubercled. Fl. May–June; fr. July–August.

Stony and calcareous slopes. — European part: Crimea (foothill belt in W. part). Endemic. Described from a cultivated specimen of unknown provenance (reference to Peru as country of origin is manifestly incorrect). Type in Paris.

10. *S. adenostachya* Juz. in Bot. mat. gerb. Bot. inst. AN SSSR, XIV (1951) 29. — *S. scabiosifolia* auct. fl. Tauriae. — Ic.: Yuzepch. op. cit. 31. Fig. 2.

Subshrub, 20–45 cm high; stems several, woody, simple or branched from base, erect, densely leafy; all internodes densely covered with long fine multicellular eglandular and short appressed upcurved hairs, the upper internodes and inflorescence-axis with fine long-stipitate black-headed glands; leaves short-petioled, elliptical in outline, 5–8.5 cm long, 2–5 cm broad, imparipinnatisect, the lateral 5–6 pairs, linear, (12) 20 (40) mm long, (1) 2 (3) mm broad, the terminal segment similar or slightly broader than the lateral, the segments acute, covered on both sides (more densely beneath) with short appressed hairs, the petiole and rachis covered with long fine strict as well as short hairs; indument as a whole more copious compared with *S. scabiosifolia*; floral leaves shorter than calyx, ovate, the lower long-attenuate at apex (the pointed part longer than the rest of the blade), the upper short-pointed, all sessile, densely covered on both sides with long fine hairs often intermixed with long-stipitate black-headed glands; inflorescences terminal, rather lax in flower; verticillasters 5–11, distant, 6–10-flowered; pedicels short, erect, very slightly white-pubescent in fruit; bracteoles elliptical, densely long-pubescent; calyx slightly enlarged in fruit, 11–15 mm long, prominently 12–13-nerved, covered outside with long simple fine multicellular hairs and long-stipitate black-headed glands, inside in upper half with subsessile hairs [glands?] upper lip with 3 very short equal or subequal teeth; lower lip with 2 broad triangular teeth, slightly shorter than the upper; corolla 3–3.5, rarely 4 cm long, white (pale) with bluish marking; tube short, slightly exserted; upper lip erect, emarginate, shorter than the lower, covered outside with long fine multicellular hairs and short-stipitate black-headed glands as well as copious sessile glands; lower lip with suborbicular reflexed lateral lobes, the middle lobe large, broadly obovate to suborbicular, 17 mm broad; stamens concealed under upper lip; filaments about as long as connective; anterior arm of connective half as long as the posterior, strongly enlarged at junction with sterile anther; anther-locules connate in front; style slightly exserted; lobes of stigma subequal; nutlets globose, 4 mm in diameter, dark brown, punctulate-tubercled. April–July.

Exposed stony slopes. — European part: Crim. (E.) Endemic. Described from Planerskoe (form. Koktebel<sup>9</sup>). Type in Leningrad.

11. *S. demetrii* Juz. in Bot. mat. gerb. Bot. inst. AN SSSR, XIV (1951) 30.

Subshrub, 20–35 cm high; stems several, woody, branched nearly up to inflorescence, densely leafy; all internodes covered (the upper more densely), with long fine inconspicuous simple hairs intermixed with short appressed upcurved hairs, the lower and middle internodes also with scattered short- and long-stipitate pale-headed glands, the upper internodes and inflorescence-axis densely covered with long-stipitate black-headed glands; leaves short-petioled, elliptical in outline, 5.5–6.5 cm long and 3–5 cm broad, imparipinnatisect, the lateral segments 5–6 pairs, linear, (12) 24 (40) mm long, (1) 3 (6) mm broad, acute, densely covered on both sides (upper side more sparsely hairy, sometimes subglabrous) with short appressed hairs intermixed with short- and long-stipitate pale- and black-headed glands, the petiole and rachis covered with short hairs as well as long fine upright hairs; floral leaves shorter than calyx, ovate, the lower long-acuminate (the pointed part longer than the rest of the blade), the upper short-pointed, all sessile, densely covered on both sides with fine hairs and numerous



long-stipitate black-headed glands; inflorescences terminal, more congested than in preceding species, with 5–12 approximate 6–10-flowered verticillasters; pedicels short, erect, densely white-pubescent in fruit; bracteoles elliptical, densely covered with long black-headed glandular hairs; calyx slightly enlarged in fruit, 16–18 mm long, prominently 12–13-nerved, covered outside with long fine multicellular eglandular hairs and long-stipitate pale-headed glands, subglabrous inside, in upper half with scattered short-stipitate glands; upper lip exceeding the lower, with 3 very short teeth, the middle tooth broad, much larger than the lateral, mucronate from apical notch; lower lip with 2 broad ovate teeth, all teeth very shortly subulate-pointed; corolla 3.5–4 cm long, pale, with bluish markings; tube short, slightly exserted; upper lip erect, emarginate, shorter than the lower, covered outside with long fine multicellular hairs and short-stipitate black-headed glands; lower lip with semiorbicular reflexed lateral lobes, the middle lobe large, broadly obovate, 15 mm broad, greatly exceeding the lateral; stamens concealed under the upper lip; anterior arm of staminal connective with sterile anther; sterile anthers connected; style slightly exserted; lobes of stigma subequal; nutlets globose, 3 mm in diameter, black, punctulate-tubercled. June–July.

272 Stony places on limestone plateaus. — European part: Crimea (on limestone plateaus). Endemic. Described from the Baidar limestone plateau (Melas). Type in Leningrad.

Section 2. **Physosphace** Bge. in Mem. Acad. Sc. Petersb. VII ser. XXI, 1 (1874) 41. — *Polakia* Stapf in Denkschr. Akad. Wien, L (1885) 43, gen. Calyx slightly inflated; upper lip 3-toothed, with very small or (in Iranian species) subulate-pointed middle tooth, or 2-toothed; upper lip of corolla about as long as the lower, broad, revolute-margined; posterior arm of staminal connective 2–3 times as long as the anterior arm; both anther-locules fertile; verticillasters 2–3-flowered; flowers with linear bracts; perennial herbs with a rosette of numerous radical leaves; cauline leaves in 1 or 2 whorls, very small or modified, disposed, like the branches, in 3's (an anomaly in Labiatae but a consistent feature of this section).

An Iranian species, *S. aristata* Aucher ex Benth., is the type species of this section, and differs from the Central Asian representatives with regard to a feature significant for the genus *Salvia*, namely in the absence of a ring of hairs in the corolla-tube; no other differences of sectional significance have been found in the species concerned.

12. *S. trautvetteri* Rgl. in Tr. bot. sada, VI (1879) 355. — *S. trautvetteri* Rgl. var. *karatavica* Lipsky in Mat. dlya Fl. Sr. Az. I (1900) 93, p. p.

Perennial, 20–30 cm high; root stout, woody, thickened at the tip, dark brown; stem one or several, short, one-third to one-half the length of inflorescence, erect, simple, covered from base with very long scattered fine multicellular hairs intermixed with long-stipitate small-headed glands; indument more copious on upper internodes, especially in inflorescence, with an increased proportion of long and short glandular hairs; radical leaves numerous, pale green, oblong or elliptical in outline, (3) 4 (6) cm long, (0.5) 1.5 (2) cm broad, deeply pinnatisect, the segments flexuous-linear, covered on both sides (more sparsely above) with long fine multicellular hairs and small

long-stipitate glands, the petiole half the length of blade or shorter, covered with patent long-stipitate glands and sparse, long, very fine multicellular hairs; cauline leaves 1 whorl, very rarely 2 whorls, smaller, sessile, pinnate; lower floral leaves very small, simply pinnate with a linear terminal lobe or narrow, linear, sessile, entire, copiously glandular-hairy, the upper linear, entire, long-acuminate, not subulate-pointed, with indument as on cauline leaves; inflorescence simple or with 1 or 2 pairs of short leafless branches at base, racemiform, with approximate 2–3-flowered verticillasters; pedicels as long as or shorter than calyx, with patent glandular hairs, slightly nodding; bracts linear, green, hairy like pedicels, half the length of calyx and scarcely distinguished from floral leaves; calyx green, slightly enlarged in fruit, 16–18 mm long, narrowed at base, with hairs as on stem, these interspersed with short-stipitate glands; upper lip with a very small middle tooth and lateral teeth 3–4 times as long; lower lip deeply incised, with 2 ovate teeth, all teeth subulate-pointed; corolla white, 3.5–4.5 cm long, the tube gradually dilated toward throat, with fimbriate ring ascending opposite the upper lip; upper lip slightly exceeding the lower, emarginate, revolute-margined, glabrous, with nearly suborbicular lateral lobes and a broad obovate concave drooping middle lobe; stamens and style exerted; filaments one-and-a-half times as long as connective, the anterior arm of connective one-third the length of the posterior, the sterile anther-locules slightly shorter than and resembling the fertile; upper stamens transformed into distinct staminodes; lobes of stigma subequal; nutlets 5 mm long, trigonous-globose, brown, dark-striate; receptacle white-tomentose, with very small indistinct lobes. May–June. (Plate XIV, Figure 1.)

Stony and stony-clayey mountain slopes. — Centr. Asia: T. Sh. (Karatau range). Endemic. Described from Karatau Mountains. Type in Leningrad.

**Economic importance.** All Soviet species of this section contain essential oil. The yield and composition of the oil have not been determined.

13. *S. lipskyi* Pobed. sp. n. in Addenda XX, 654. — *S. trautvetteri* Rgl. var. *karatavica* Lipsky in Mat. dlya Fl. Cr. Az. I (1900) 93, p. p.

Perennial, 20–30 cm high; root woody, not thickened at the end, grayish-brown; stems 1 or 2, as long as or exceeding inflorescence, erect, simple, densely covered from base with long fine multicellular hairs intermixed with long-stipitate glands; indument on inflorescence-axis more copious and also including short-stipitate glands; leaves few, radical, pale green, oblong in outline, (4) 5.5 (7) cm long, (1.5) 2.5 (3) cm broad, deeply pinnatisect, the segments oblong, pinnatifid, covered on both sides, more densely beneath, with short-stipitate and few long-stipitate glands; petioles as long as blade, patent-hairy like the stem; cauline leaves in 2's or in 3's, the lower pinnate, smaller than the radical, the upper simple, lanceolate, small, entire, all sessile, densely covered with short-stipitate and fewer long-stipitate glands; foliar leaves lanceolate, as long as or shorter than pedicels, simple, entire, densely glandular-pubescent like the upper cauline leaves, long-acuminate with a subulate point; inflorescence simple or with 1–2 pairs of short leafless branches at base, racemiform, with 2–3 approximate verticillasters; pedicels subnutant, half the length of calyx; bracteoles green, linear, glandular-pubescent, with finely long-ciliate margin, half the length to slightly shorter than floral leaves; calyx 15–22 mm long, slightly enlarged in fruit, not narrowed toward base, covered with short and long small-headed hairs; upper lip 2-toothed, without a middle tooth; lower lip 2-toothed, all teeth



PLATE XIV. 1 – *Salvia trautvetteri* Rgl.; 2 – *S. compar* Trautv.; 3 – *S. schmalhauseni* Rgl., general aspect and parts: flower, fruiting calyx, stamens, lower lip of corolla.



subequal, shortly subulate-pointed; corolla white, twice as long as calyx, the tube gradually dilated toward throat, with a fimbriate ring rising opposite the upper lip; upper lip about as long as the lower, broad, deeply notched at apex, revolute-margined, glabrous; lower lip with subequal semiorbicular lobes, the middle lobe slightly broader than the lateral, drooping; stamens and style slightly exserted from under upper lip; filaments one-and-a-half times as long as connective, the anterior arm of connective one-third the length of the posterior; anther-locules equal, both fertile; staminodes well developed; lobes of stigma subequal; nutlets 4 mm long, trigonous-globose, brown, pale-striate. May.

Stony mountain slopes. — Centr. Asia: Syr D. Endemic. Described from Chimkent (Kornilovka village). Type in Leningrad.

- 277 14. *S. komarovii* Pobed. in Addenda XX, 655. — *S. trautvetteri* Rgl. var. *zaraw-schanica* Lipsky, Mat. dlya Fl. Cr. Az. I (1900) 93.

Perennial, 25–50 cm high; root woody, dark brown, not thickened at the end; stems 1–3, as long as or longer than inflorescence, rather densely covered below with long and short large- and small-headed hairs, these intermixed in inflorescence (especially in upper part), with long fine multicellular hairs; radical leaves few, ovate, (3) 5 (7) cm long, (3) 3.5 (4) cm in lower part, deeply dissected, the segments elliptical or oblong, deeply toothed or sometimes lobed, acute, the upper side green, glabrous or sparsely covered with mostly short glandular hairs, the lower side densely covered with very long fine multicellular hairs, these intermixed with long and short glandular hairs; petiole densely patent-hairy, as long as or slightly shorter than blade; cauline leaves in whorls of 3 or 4, the lower resembling the radical but smaller, short-petioled or sessile; upper cauline and floral leaves lanceolate or elliptical, simple, entire, sessile, acute, covered above with fine long appressed hairs, the lower side and margin with similar, more copious hairs, these interspersed with long- and short-stipitate glands; inflorescence branched, racemiform, the branches ternate at two lower nodes; verticillasters more or less distant, 2–3-flowered; pedicels one-quarter to one-third, rarely one-half the length of calyx, finely patent-hairy; bracteoles small, elliptical, green, covered on both sides with long large-headed glandular hairs; calyx 19–20 mm long, not narrowed toward base, covered with long fine multicellular hairs intermixed with short and small-headed glandular hairs, nearly always lilac-tinged, slightly accrescent; upper lip with short triangular lateral teeth and a very small middle tooth; lower lip shallowly incised with 2 triangular teeth, all teeth shortly subulate-pointed; corolla white (?), 2–2½ times as long as calyx, the tube gradually dilated toward throat, with fimbriate ring ascending opposite the upper lip; upper lip slightly longer than the lower, deeply notched at apex, revolute-margined, glabrous; lower lip with broad-ovate lateral lobes and broad-obovate overhanging middle lobe; filaments and style exserted; filaments one-and-a-half times as long as connective; anterior arm of connective one-third the length of the posterior, the anterior anther-locules equaling the posterior, 278 fertile; upper stamens staminodial; stigma reddish, with subequal lobes; nutlets 5 mm long, trigonous-globose, brown, dark-striate; receptacle glabrous, with indistinct lobes. Second half of May–July.

Stony mountain slopes. — Centr. Asia: Pam.-Al. (Zeravshan). Endemic. Described from Zeravshan (Shink village). Type in Leningrad.

15. *S. submutica* Botsch. et Vved. in Bot. mat. Gerb. inst. bot. AN UzSSR, XIV (1954) 13.

Perennial; stems solitary or several, 15–20 cm long, erect, simple, densely stipitate-glandular, in inflorescence also with short glandular hairs; radical leaves numerous, petiolate, oblong-lanceolate, pinnatisect, with narrowly winged rachis and deeply pinnatilobate lobes, densely covered with short-stipitate glands, these intermixed on petiole and midrib with long spreading eglandular hairs; basal and cauline leaves (one pair) with shorter petiole, more pointed lobes, otherwise resembling radical leaves; middle and upper leaves much smaller, simple, sessile; flowers on pedicels 10–12 mm long, in distant 4-flowered whorls at end of stem; bracts herbaceous, relatively small, oblong, narrowed at base, stipitate-glandular; calyx broadly campanulate, slightly inflated, 22–23 mm long, densely covered with short stipitate glands intermixed with fine longer eglandular hairs, obscurely 2-lipped, the broadly triangular (not subulate-pointed) teeth one-fifth to one-fourth the length of tube; corolla apparently cream-colored; nutlets depressed obovoid-ellipsoid, pale brownish, 4–5 mm long. May–August.

Granite taluses in the middle mountain belt. — Centr. Asia: Pam.-Al. Endemic. Described from Nuratau Mountains. Type in Tashkent.

Note. The description is based on the diagnosis of the authorities; we have not examined type specimens.

16. *S. glabricaulis* Pobed. sp. n. in Addenda XX, 656. — *S. trautvetteri* var. *seravschanica* auct. fl. As. Med. non Lipsky.

Perennial, 30–35 cm high; root woody, thickened, dark brown, with a grayish tip; stem erect, simple or with ternate branches in 1 or 2 whorls and exceeding the inflorescence, the lowest internode covered with scattered long-stipitate glands and sparse short thick-based hairs, other internodes subglabrous or with isolated short thick-based hairs, in inflorescence also with long fine multicellular hairs and in its upper part with numerous long- and short-stipitate glands; leaves few, green, predominantly radical, 279 elliptical, 5–6 cm long, 2–2.5 cm broad, deeply cut into obtusely toothed lobes, subglabrous above with few scattered basally thickened appressed hairs, rather densely covered beneath with long fine multicellular and shorter thick-based hairs as well as long- and short-stipitate glands; petioles as long as or slightly longer than blade, densely covered with long fine patent hairs and long glandular hairs; cauline leaves ternate in 2 or 3 whorls, smaller, short-petioled or sessile, often subtending leafy branches with terminal inflorescences; floral leaves elliptical or ovate, undivided, long-attenuate at apex, entire, finely long-ciliate, the upper side glabrous or with isolated appressed hairs thickened at base, the lower side covered with long and short glandular hairs; verticillasters 1–2-flowered; pedicels the length of calyx; bracts very small, green, densely covered with simple fine hairs and long-stipitate glands; calyx 10–16 mm long, reddish, not narrowed below, covered with long and short glandular

hairs interspersed with few simple multicellular hairs, cleft nearly to the middle; upper lip with 2 short broad-ovate teeth (middle tooth wanting); lower lip with 2 shallow triangular teeth, all teeth mucronate; corolla twice to three times as long as calyx, the tube gradually dilated toward throat; upper lip about as long as the lower, broad, deeply notched at apex, revolute-margined; corolla-lips and often the tube covered outside with fine implexed hairs; lateral lobes of lower lip broadly triangular, about equaling the rounded middle lobe; stamens and style slightly exserted; filaments one-and-a-half times as long as the connective; anterior arm of connective about half the length of the posterior, the anterior anther-locules about equaling the posterior locules, fertile, all reddish and covered with fine implexed hairs; staminodes well developed; lobes of stigma unequal; nutlets unknown.

Gravelly slopes. — Centr. Asia: Syr D., Pam.-Al. (?). Endemic. Described from Okurtau range (Kansai). Type in Leningrad.

17. *S. lilacinocoerulea* Nevski in Tr. Bot. inst. AN SSSR, 1, 4 (1937) 327, p. p. — *S. trautvetteri* Rgl. *β. seravschanica* auct. fl. As. Med. non Lipsky.

280 Perennial, 30–55 cm high; stem erect, doubly branched, covered from base with very long fine patent multicellular as well as long and short glandular hairs; more densely hairy in inflorescence, with a higher proportion of multicellular hairs; radical leaves very numerous, oblong or suboblong-ovate, (3.5) 4 (7) cm long, (1) 2 (3) cm broad, deeply cut into ovate or obtusely triangular-toothed lobes, covered on both sides, more densely beneath, with hairs as on stem; petioles as long as blade or slightly shorter, densely covered with patent white hairs; cauline leaves decreasing in size toward summit, sessile, pinnatisect with broadly linear segments; floral leaves elliptical, green, short-acuminate, hairy like other leaves but more densely so; inflorescence branched, the branches in 3's from nodes, long, strict, often branching in turn; verticillasters distant, 2–3-flowered; pedicels as long as calyx, with patent white hairs; bracts small, green, with similar hairs; calyx 16–18 mm long, not narrowed toward base, cleft to one-third its length, densely hairy; upper lip shallowly bidentate; lower lip with 2 similar short teeth; corolla pale lilac-blue, 4–4.5 cm long, the tube one-and-a-half times as long as calyx; lips short, subequal; upper lip broad, emarginate, revolute-margined, covered with isolated strict hairs; lateral lobes of lower lip suborbicular, reflexed, the middle lobe rounded, narrowed toward base; stamens and pistil slightly exserted; filaments one-and-a-half times as long as connective; all anther-locules equal, fertile, with scattered hairs; anterior arm of connective half the length of the posterior; staminodes well developed; lobes of stigma subequal; nutlets unknown. May–June.

Mountain slopes, at the lower limit of juniper groves. — Centr. Asia: Pam.-Al. (Kugitang, Yakkabag, Guzar, Baisun). Endemic. Described from Kugitang (Khodzha-Fil'-Ata). Type in Leningrad.

Section 3. *Drymospace* Benth. in Hook. Bot. Misc, 3 (1833) 373 in adnot.; Benth. Lab. Gen. et sp. 218; Boiss. Fl. or. IV, 609. — Calyx not inflated, the upper lip of corolla falcate, compressed, exceeding the lower lip or, if shorter, then reflexed;



corolla-tube pubescent inside nearly all over; posterior arm of staminal connective longer than the anterior; anterior anther-locules sterile; verticillasters 6-flowered.

281 European and Asian glandular-hairy herbs with paired hastate-cordate or suborbicular leaves.

18. *S. glutinosa* L. Sp. pl. (1753) 26; Etling, Salv. 38; Georgi, Beschreib. d. Russ. R. III, 4, 658; M. B. Fl. taur-cauc. I, 22; Benth. Lab. Gen. et sp. 218; Ldb. Fl. Ross. III, 359; Benth. in DC. Prodr. XII, 276; Boiss. Fl. or. IV, 609; Shmal'g. Fl. II, 317; Grossg. Fl. Kavk. III, 316. — *Sclarea glutinosa* Mill. Gard. Dict. (1768) No. 11. — Ic.: Rchb. Ic. fl. Germ. XVIII, tab. 1246; Fedch. and Fler. Fl. Evrop. Ross. 824; Syreishch. Fl. Mosk. gub. III, 83. — Exs.: Fl. stir. No. 1035; Fl. exs. Austro-Hung. No. 2960; Fl. Boh. et Mor. No. 671; Fl. Gall. et Germ. No. 2339; Pl. Hercegov. No. 217; Fl. siles. No. 918.

Perennial, 100–125 cm high; stem erect, simple, covered the whole length with multicellular hairs (these with broad flat lower segments) intermixed in inflorescence with long-stipitate glands; leaves ovate-oblong, sparsely pubescent on both sides or glabrous, only on the veins covered with similar appressed multicellular hairs; petiole as long as or longer than blade, rarely shorter, densely covered with strict and appressed multicellular hairs; lower floral leaves small, 2–4 cm long, elliptical or oblong, very long-acuminate, cordate or cuneate at base, dentate, short-petioled or sessile, the indument as on other leaves; upper floral leaves ovate or elliptical, long-acuminate, sessile, shorter than calyx, tapering toward base, covered beneath and at margin with fine multicellular hairs intermixed with long-stipitate glands; inflorescence much shorter than stem, simple or with 1–2 pairs of branches, these not reaching the summit of main stem; verticillasters 10–12, spaced 1–2 cm apart, 6-flowered; flowers yellow, with reddish dots and markings on the lips, rarely purple (var. *purpurea* Poplav. in herb.); pedicels half the length of calyx, densely glandular-pubescent; bracts small, elliptical, long-glandular-ciliate; some flowers ebracteate; calyx 10–12 mm long, densely covered outside (especially on tube) with long glandular hairs, inside in upper part or nearly to base with scattered short appressed thick-based hairs; upper lip of calyx half-rounded, shorter than the lower, 3-toothed, the teeth very short, connivent; lower lip with 2 teeth to one-fifth the length of calyx; corolla 3–4 cm long, exceeding the calyx; tube long, prominently exserted; upper lip falcate, compressed laterally, slightly reflexed, deeply notched at apex, covered with short glandular black-headed hairs; lateral lobes of lower lip long, transversely elliptical-oblong, reflexed, the middle lobe shorter, broadly obovate, deeply toothed, sublobate at the broad margin, reflexed, pubescent outside, glandular-hairy outside like the tube, with fine simple hairs inside; filaments slightly shorter than connective and jointed to it nearer the sterile anther-locule, hence the posterior arm of connective three to four times as long as the anterior; posterior locules to 1 cm long, about equaling the posterior arm; anterior locules modified, half-rounded, callous-margined, sterile, connate; style exserted; lobes of stigma very unequal, one broad, twice to three times as long as the other; nutlets ellipsoid, 3 mm long, brown, dark-reticulate. Second half of June to August.

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Shady forests, wet soil rich in humus. — European part: U. V., U. Dnp., V.-Don, Transv., U. Dns., Crim.; Caucasus: throughout, except Talysh. Gen. distr.: Centr. and Atl. Eur., W. and E. Med. Described from Europe. Type in London.

**Economic importance.** The plant contains essential oil, but the yield obtained from dry plants harvested in full flower was insignificant. The oil is greenish in color and has a rather unpleasant musky scent (Nilov and Vil'yams in Zap. Gos. Nikitsk. bot. sada, IX, 1, 1929).

19. *S. forskaelei* (S. Forskolei) L. Mant. (1767) 26; Etling, Salv. (1777) 32; Vahl, Enum. I, 275; Benth. Lab. Gen. et sp. 221 et in DC. Prodr. XII, 276; Boiss. Fl. or. IV, 609. — *S. bifida* Forsk. Fl. aegypt.-arab. (1775) 202. — *S. longipetiolata* C.Koch in Linnaea, XXI (1848) 657. — Ic.: Bot. Mag. XXV, tab. 998; Willd. Hort. Berol. (1816) tab. 20; Sibth. et Sm. Fl. Gr. I, 16, tab. 21.

Perennial, 35–60 cm high; stem simple, erect, much shorter than to as long as inflorescence, densely covered from base with long 2- to many-celled hairs (the broad flat basal segment 1 mm long) or finer hairs intermixed with long-stipitate glands; inflorescence-axis with scattered long fine multicellular hairs and long-stipitate glands; leaves predominantly radical, numerous, broad-elliptical to suborbicular, (8) 14 (15) cm long, (6) 9 (12) cm broad, with or without a pair of small lobes at base, obtuse or rounded at apex, cordate at base, doubly obtuse-dentate or crenate, covered on both sides with scattered 2-celled hairs (the basal segment long, flat and broad, the upper 283 short and finely pointed), the petiole as long as or longer than blade, densely covered with similar hairs; cauline leaves small, sessile, more densely hairy; floral leaves orbicular, abruptly attenuate at apex and terminating in a point, sessile, clasping, appressed-puberulent above, covered beneath with long slender multicellular hairs intermixed with long fine glandular hairs; bracts narrow, small, oblong, subulate-pointed, with similar indument; inflorescence simple, rarely with a short branch at base, long; verticillasters 6–12, very distant, 6-flowered, the uppermost always sterile; pedicels densely white-pubescent, half the length to nearly the length of calyx; calyx broadly campanulate, 12 mm long, covered on the veins with long and short glandular hairs and isolated long fine multicellular hairs, otherwise glabrous; upper lip longer than the lower, with 3 short widely separated teeth; lower lip somewhat less deeply incised, the two teeth lanceolate; all teeth subulate-pointed; corolla violet, 2.5–3 cm long, the tube exerted at calyx-length; upper lip as long as or shorter than the lower, recurved, broad, cut nearly halfway to base into broad obtuse lobes; lateral lobes of lower lip rounded at apex, fused nearly the whole length with the middle lobe, the middle lobe suborbicular, notched at apex; stamens exerted, the upper anther-locule to 5 mm long, jointed to connective about its end, the lower sterile locules not connate, broadly obovoid, callous at the broad margin; style prominently exerted, twice as long as the upper lip; style-branches very short, unequal; nutlets globose, 2 mm in diameter, dark brown; receptacle conical at insertion of nutlets, ribbed, the disk with appressed lanceolate lobes between the nutlets. June–October.

Dry southern slopes, in scrub and dry deciduous woods. Not found on U.S.S.R. territory, but occurring in areas adjoining W. Transcaucasia. **Gen. distr.:** Bal.-As. Min., Arm.-Kurd. Described from "the East." Type in London.

This species grows along the river Chorokh and it may also occur on the Soviet side of the border along this river. It has therefore been included in the Flora of the U.S.S.R.

Subgenus 2. *Macrosphace* Pobed. subgen. n. in Addenda XX, 656. — Calyx tubular-campanulate, slightly accrescent; upper lip with long finely subulate teeth; upper lip  
284 of corolla broader than long, truncate at apex, with or without reflexed margins; corolla-tube rather long, with a ring of hairs in lower third; filaments longer than connective, jointed to it nearer the anterior locule, hence the anterior arm shorter than the posterior, terminating in a long fertile locule; upper stamens staminodial; inflorescence composed of 2-flowered verticillasters; flowers solitary in the axils of floral leaves; pedicels very long, with two small bracts at or slightly above or below the middle. Subshrubs, repeatedly branched, the branches very long, strict; leaves few, small. An endemic Central Asian subgenus.

Type species of the subgenus *S. schmalhauseni* Rgl.

Note. The subgenus *Macrosphace* is characterized by very distinctive habit (strongly branched stems, small entire leaves, solitary axillary flowers, long pedicels with bracts about the middle). We are not inclined, however, to assign to it generic status, considering that flower structure of this subgenus closely resembles that of other *Salvia* species, differing only in the broad reflexed-margined upper lip and almost identical with the flower structure of the section *Physosphace*.

20. *S. schmalhauseni* Rgl. in Tr. Bot. sada, VI, 1 (1879) 356; O. and B. Fedch. Perech. rast. Turk. V, 134, p. p.

Perennial, 40–50 cm high; root woody, vertical, dark brown; stems several, strongly branched nearly from base, covered on lower internodes with very short simple and glandular hairs interspersed with apically recurved conical hairs, glabrescent above, with isolated conical hairs in inflorescence; branches 5–8 pairs, long, strict, sometimes branching in turn; lower leaves elliptical, 2–2.5 cm long, 1–1.2 cm broad, acute, cuneate at base, coarsely dentate, subglabrous above, with scattered simple hairs, densely covered beneath with short simple and glandular hairs, the petiole very short, winged; middle and upper cauline leaves gradually smaller and glabrescent toward summit, entire, sessile, glabrous beneath or with hairs confined to midvein; floral leaves 7–15 mm long, lanceolate, subulate-pointed, glabrous; inflorescences at ends of stems and branches, short, racemiform, simple, with 4–6 very distant 2-flowered verticillasters; pedicels 15–20 mm long; bracts slightly above the middle, small, lanceolate, acute, covered with short simple hairs; pedicels usually glabrous under the bracts, with short simple hairs above; calyx green, with violet nerves, or reddish-violet,  
285 1–2 cm long, cleft one-third its length, covered outside with scattered short glandular conical simple hairs; upper lip 3-toothed, the middle tooth usually shorter, the lateral teeth reflexed; lower lip with 2 narrow lanceolate strict teeth; all teeth subulately long-pointed, 7 mm long, pubescent; corolla violet, 3.5–4 cm long, covered outside with short fine hairs intermixed with glandular hairs; corolla-tube narrow, exerted a calyx-length; upper lip broader than long, squarely truncate at apex, slightly emarginate; lateral lobes of lower lip broad, half-rounded, reflexed, the middle lobe transversely elliptical, narrowed toward base, emarginate, drooping; style and stamens exerted, exposing the whole connective and both anther-locules; filaments longer than connective, the anterior arm of connective half the length of the posterior; all anther-locules fertile; upper stamens staminodial; connective covered with simple hairs; lobes



of stigma unequal; nutlets globose or ellipsoid, 5 mm in diameter, flattened, brown; receptacle high, glabrous; disk without lobes between nutlets. June–August. (Plate XIV, Figure 3).

Clayey slopes, mottled rocks, conglomerate screes, often in pistache woods. — Centr. Asia: T. Sh. Endemic. Described from Mailisu (near Namangan). Type in Leningrad.

21. *S. margaritae* Botsch. in Byull. Sr.-Az. Gos. univ. 22 (1937) 324.

Perennial, 30–100 cm high; root woody, brown; stems several, with 4–10 pairs of branches, densely covered on lower internodes with short-stipitate glands and few short simple hairs, less glandular above, eglandular in upper part and in inflorescence, with isolated conical hairs; branches long, strict, sometimes branching in turn; lower leaves elliptical, 1.5–2.4 cm long, 0.5–0.8 cm broad, acute, cuneate, coarsely dentate, subglabrous above, with few scattered short glandular hairs and some short simple hairs, densely covered beneath with short glandular and very few simple hairs; petioles short, winged; middle and upper cauline leaves gradually decreasing in size toward summit of stem, entire, sessile, gradually glabrescent, pubescent beneath on midvein or quite glabrous; floral leaves 0.4–0.9 mm long, 0.5–1.5 mm broad, elliptical, acute, without subulate point, narrowed toward base, sessile or with very short winged petiole, glabrous; inflorescences at ends of stems and branches short, racemiform, simple, with 4 or 5 very distant 2-flowered verticillasters; pedicels 9–10 mm long; bracteoles inserted at one-third the pedicel length under the flower, small, lanceolate, green or violet-tinged, densely covered with short simple hairs, acute; pedicels densely covered above the bracts with short simple hairs, less densely so below, glabrous toward base; calyx green or violet, 1.5–2 cm long, cleft to one-third, with scattered short-stipitate glands; middle tooth of upper lip shorter than the lateral teeth; lower lip longer than the upper, more deeply toothed, the teeth subulate-tipped; teeth of upper lip 2–3 mm long, those of lower lip 3–4 mm long, glandular-pubescent nearly to the tip; corolla 2.5–3.5 cm long, intensely violet, covered outside with short glandular and simple hairs, the tube narrow, exerted the length of calyx; upper lip squarely truncate at apex, broad, with reflexed margins, emarginate; lateral lobes of lower lip broad, half-rounded, the middle lobe broader than in *S. schmalhausenia*, emarginate, slightly exceeding the lateral lobes, reflexed; style and stamens exerted; filaments longer than connective, the anterior arm of connective half as long as the posterior; all anther-locules fertile; upper stamens staminodial; connective glandular-hairy; lobes of stigma very unequal; nutlets unknown. May–August.

Stony and gravelly-stony slopes, in xerophytic semidesert plant associations. — Centr. Asia: Pam.-Al. Endemic. Described from Shakhimardan. Type in Tashkent.

22. *S. drobovii* Botsch. in Byull. Sr.-Az. Gos. univ. 22, (1937) 326. — *S. schmalhausenia* auct. Fl. As. Med., non Rgl.

Perennial, 20–40 cm high; root woody, stout, dark brown; stems several, branched nearly from base, densely covered on lower internodes with short glandular and few

short simple hairs, with more simple and fewer glandular hairs above, again predominantly glandular-hairy in inflorescence; branches 3–4 pairs, long, strict, sometimes branching in turn; lower leaves elliptical, 2–2.5 cm long, 1–1.2 cm broad, obtusish or acute, cuneate at base, coarsely dentate, covered on both sides with short glandular hairs, these intermixed (more densely beneath), with short simple hairs; petioles short, winged; middle and upper cauline leaves gradually decreasing in size toward summit of stem, entire, short-petioled or sessile, hairy like the lower but somewhat more sparsely; floral leaves 7–10 mm long, 2–3 mm broad, lanceolate, subulate-pointed, 287 with indument as on other leaves; inflorescences at ends of stems and branches short, racemiform, simple, with 4–6 very distant 2-flowered verticillasters; pedicels 6–8 mm long, densely glandular-hairy especially under the calyx; bracts inserted slightly below the middle of pedicel, small, lanceolate, green or violet-tinged, subulate-pointed, densely covered with simple hairs intermixed with glandular; calyx reddish-violet, 1.5–2 cm long, cleft more than one-third its length, densely glandular-hairy outside, the teeth densely covered outside and inside with short fine simple hairs; upper lip shorter than the lower, the middle tooth slightly shorter than the lateral, all teeth slightly reflexed; lower lip with 2 longer straight slender teeth; all teeth subulate-pointed; corolla 2.5–3 cm long, violet, exerted to half its length, covered outside with short glandular hairs; upper lip short, broad, truncate at apex, with large unequal obtuse teeth and reflexed margins; lower lip as long as the upper, the lateral lobes broad, half-rounded, reflexed, the middle lobe broad, deeply notched, hairy-margined, drooping; style slightly exceeding the upper lip of corolla, glandular-pubescent; stamens not exceeding the upper lip of corolla; staminal filaments longer than connective, the anterior arm of connective shorter than the posterior; all anther-locules fertile; upper stamens staminodial; nutlets unknown. May–July.

Stony slopes, on rocks. — Centr. Asia: Pam.-Al. Endemic. Described from Urgut. Type in Tashkent.

Note. The distinguishing feature of this species, indicated in the original description, is the reflexed middle tooth of upper calyx lip. This feature is not evident in the very limited material at our disposal. All the three teeth are slightly reflexed and this is clearly shown in the illustration accompanying the original description.

23. *S. aequidens* Botsch. in Byull. Sr.-Az. Gos. univ. 22, (1937) 326.

Perennial; stem branched from base, covered at flowering time with short glandular and simple hairs, glabrescent in inflorescence after fruiting; branches long, strict, strongly branching in turn; leaves pale green, thickened, ovate or oblong, 1.5–2 cm long, 0.6–0.8 cm broad, acute, rounded at base, the lower and middle coarsely dentate, the upper entire, short-petioled or sessile, covered on both sides (more sparsely above) with short glandular hairs; floral leaves thick, glabrous or with scattered subsessile 288 glandular hairs and on the midvein beneath with isolated simple conical hairs; inflorescences terminal, short, racemiform, with 3 or 4 very distant 2-flowered verticillasters; pedicels 10–14 mm long, densely glandular-pubescent the whole length, more sparsely at base; bracts in upper quarter under the flower, small, lanceolate, densely glandular-pubescent, shed in maturity; calyx pale-green, prominently nerved,

16–20 cm long, cleft one-third to nearly halfway to base, densely covered with long-stipitate small-headed glands; upper lip slightly longer than the lower, with 3 equal or subequal teeth; lower lip with 2 longer triangular teeth; all teeth shortly subulate-pointed; corolla 2.5 cm long, violet, glandular-hairy outside, the short narrow tube nearly included in calyx; upper lip of corolla about equaling the lower, coarsely obtusely and unevenly toothed, with reflexed margins; lateral lobes of lower lip broad, reflexed, the middle lobe broad, emarginate, reflexed; staminal connective glandular-pubescent, its anterior arm one-fourth to one-third the length of the posterior; anterior anther-locule slightly shorter than the posterior; all anther-locules fertile; style greatly exceeding the upper lip, glandular-pubescent; lobes of stigma unequal; nutlets unknown. July.

Foothills. — Centr. Asia: Pam.-Al. Endemic. Described from the foothills of the Turkestan range (river Aksu). Type in Tashkent.

24. *S. campylodonta* Botsch. in Byull. Sr.-Az. Gos. univ. 22, (1937) 327.

Perennial, 30–35 cm high; stems several, twice branched nearly from base, covered from base with simple, apparently viscous hairs (with adhering grains of sand) and short glandular hairs, the middle internodes eglandular or with isolated glandular hairs, the upper internodes and inflorescence-axis completely glabrous or with isolated conical simple hairs; lower leaves broadly elliptical, 1.2–2.2 cm long, 0.8–1.2 cm broad, subobtusely, cuneate at base, distantly coarse-dentate, the upper side with minute subsessile glands, the lower side also with rather profuse simple conical hairs; petioles short, winged; middle cauline and rameal leaves much smaller, lanceolate, obtusish, sessile, glabrous or with isolated conical hairs; floral leaves very small, ovate, obtuse, covered beneath on midvein and at margin with scattered conical hairs; all leaves rather thick; inflorescences terminal, racemiform, simple, with 4 or 5 very distant 2-flowered verticillasters; pedicels 7–12 mm long; bracts borne at or slightly below the middle of pedicel, small, lanceolate, densely covered on both sides with short  
289 conical simple hairs; pedicels similarly hairy above the bracts, less densely below; calyx 12–17 mm long, usually violet-tinged, cleft to one-third its length into subequal lips; upper lip sparsely covered on both sides with simple and short-stipitate glands, with 3 subequal long-acuminate pubescent teeth, the two lateral ones incurved; lower lip with 2 acuminate teeth; corolla 2.5–4 cm long, violet, rather densely covered outside with fine crisp simple hairs and short-stipitate glands; calyx-tube long, greatly exceeding the calyx; upper lip short, truncate, emarginate, revolute-margined; lateral lobes of lower lip half-rounded, reflexed, the middle lobe broader, elliptical, emarginate, drooping; stamens barely exerted, the connective covered with short glandular hairs, the anterior arm half the length of the posterior; upper stamens staminodial; style prominently exerted; lobes of stigma very unequal; nutlets unknown; receptacle high, glabrous; disk without distinct lobes between nutlets. June.

Stony and gravelly, strongly gypsiferous slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Seistan Mountains (to the east of Stalinabad). Type in Tashkent.

Note. A single specimen with an eglandular calyx, collected by Goncharov, Grigor'ev and Nikitin at Garmak in the Vakhsh range, on raspberry-colored sandstone



rocks, closely approaches *S. schmalhauseni*, but resembles *S. campylodonta* in a number of characters. Insufficiency of material (a single herbarium leaf) collected in places inhabited by *S. campylodonta* makes it impossible to consider this plant as anything more than a deviation from the typical form of *S. campylodonta*.

Subgenus 3. **Leonia** (Llav. et Lex.) Benth. in Benth. a. Hook. f. Gen. II (1876) 1196; Briq. in Pflanzenfam. IV, 3a, 3b, 284. — *Leonia* (gen.) La Llav. et Lex. Nov. veg. descr. II (1825) 6. — Calyx with truncate upper lip; corolla with a ring of hairs at base; staminal connectives not connate anteriorly, not elongate, on long filaments, arched; anterior anther-locules fertile or sterile, not pendulous, acute, rarely (not in our species) reduced to a short tooth. Annual and perennial herbs of North America, middle and eastern Asia, Australia and North Africa.

The subgenus consists of four sections, containing about twenty species. The type species is *Salvia leonia* Benth. (*Leonia salvifolia* Llav. et Lex.).

Section 1. **Notiosphace** Benth. Lab. Gen. et sp. (1832–1836) 309, p. p. (sensu Bge.); Briq. Pflanzenfam. IV, 3a, 3b, p. p. (1897) 285. — *Notiosphace* Benth. in 290 Hook. Bot. Misc. 3 (1833) 374. — Calyx ovoid, the upper lip entire or with very short connivent teeth, the lower lip 2-parted; corolla small, the upper lip erect, the lower slightly spreading; connective inserted at the middle, the posterior arm elongate, the modified anther-locules fertile; floral leaves and bracts small. Annuals with simple leaves.

25. *S. plebeja* R. Br. Prodr. (1810) 501; Benth. Lab. Gen. et sp. 309 et in DC. Prodr. XII, 355; Kom. and Alis. Opred. rast. Dal'nevost. kr. II, 907. — *S. brachiata* Roxb. Hort. beng. (1814) 4 et Fl. Ind. I, 146. — *S. minutiflora* Bge. Enum. pl. Chin. bor. (1831) 50. — **lc.**: Somoku-Dzusetzu, Ed. Makino **lc.**, Pl. Nippon, XI, tab. 19.

Annual, 30–50 cm high; stem erect, branched, leafy, covered with very short thick-based appressed retrorse hairs and sometimes with few glandular hairs, in inflorescence mainly with short-stipitate glands; branches 2 or 3 pairs, divaricate, rather short; leaves elliptical, oblong or oblong-lanceolate, (3.5) 4.5 (5.5) cm long, (1.5) 2 (2.5) cm broad, acute to subobtusate, cuneate at base, decurrent into petiole, crenate, covered on both sides with short appressed basally thickened hairs, these more copious beneath, especially on the veins; lower floral leaves small, glandular-pubescent, short-petioled; upper floral leaves ovate, acute, sessile, entire, copiously covered beneath and at margin with sessile reddish glands, often recurved in fruit, not exceeding the pedicels; inflorescence an elongate pyramidal panicle, with 2 or 3 pairs of branches; pedicels 1–1.5 mm long, densely puberulent, recurved in fruit; bracts 2, small, elliptical-oblong ciliate; some flowers ebracteate; calyx 2–3 mm long, deciduous in maturity, covered with patent simple hairs intermixed with short-stipitate glands; upper lip rounded, with 3 very short mucronate connivent teeth, the middle shorter than the lateral;

lower lip much longer, the 2 lanceolate mucronate teeth one-quarter the length of calyx; corolla violet, 7–8 mm long; upper lip erect, emarginate, longer than the lower, covered with short glandular hairs; lateral lobes of lower lip rounded, reflexed, the middle lobe transversely elliptical, conduplicate; stamens slightly exerted, the filaments about as long as connective, attached to it at the middle, thus the arms of connective equal,  
291 the anterior gradually dilated and terminating in a reduced anther-locule with a small amount of pollen; style barely exerted; lobes of stigma unequal; nutlets pale brown, smooth, subglobose, 0.5 mm in diameter. April–July. (Plate XVII, Figure 3.)

Adventive in the U.S.S.R. — Far East: Uss. (to the south of Lake Khanka). **Gen. distr.:** Ind.-Him., China, Japan. Described from S. E. Asia. Type unknown.

Subgenus 4. **Sclarea** (Moench) Benth. in Benth. a. Hook. f. Gen. II (1876) 1195; Briq. in Pflanzenfam. IV, 3a, 3b. 274. — **Sclarea** (gen.) Moench, Meth. pl. (1794) 374. — **Horminum** (gen.) Moench, l. c. 376. — **Horminum**, *Aethiopsis* et *Pletiosphace* (sect.) Benth. Lab. Gen. et sp. (1832–1836) 195–196; Boiss. Fl. or. IV, 610. — Staminal filaments much shorter, rarely slightly shorter than connective, jointed to it near apex; anterior anther-locules always sterile, scarious, with callous protuberances at their juncture; upper stamens modified into staminodes, rarely present (Subsection *Homalosphace*); calyx campanulate, tubular-campanulate or conical, the upper lip 3-toothed, erect or recurved in fruit and then furrowed (Section *Pletiosphace*), slightly accrescent, very rarely strongly accrescent (Section *Macrocalyx*); corolla with a rather short tube, without a ring of hairs, completely without nectaries (Section *Homalosphace*) or with nectaries in the form of scarious scale fringed with glandular hairs or with a tuft of hairs; upper lip of corolla longer than the lower, falcate, compressed laterally; lower lip 3-lobed, the lateral lobes upright or directed forward, the middle lobe deeply concave. Perennial and annual herbs, with radical leaves and leafless or leafy stem, the leaves simple or pinnatisect; verticillasters 6–10-flowered, rarely 2–4-flowered.

Old World species. Type species of the subgenus *S. sclarea* L.

Section 1. **Horminum** (Moench) Benth. Lab. Gen. et sp. (1832–1836) 220. — **Horminum** pro gen. Moench, Meth. pl. (1794) 371. — Calyx tubular, the truncate upper lip with small asymmetrical lateral teeth; corolla small, the upper lip erect or slightly concave; floral leaves with linear stipules. Annuals.

26. **S. horminum** L. Sp. pl. (1753) 24; M. B. Fl. taur.-cauc. I, 19; Benth. Lab. Gen. et sp. 221; Ldb. Fl. Ross. III, 360 et in DC. Prodr. XII, 278; Boiss. Fl. or IV, 631; Shmal'g, Fl. II, 320. — *S. viridis* var. *horminum* Gams in Hegi, III. Fl. IV, 292 4 (1927) 2488. — **Horminum sativum** Mill. Gard. Dict. (1768) No. 5. — *H. coloratum* Moench, Meth. pl. (1794) 376. — Ic.: Zorn. Ic. Pl. Med. III, tab. 244. — Exs: GRF, No. 522.



PLATE XV. 1 – *Salvia chloroleuca* Rech.; 2 – *S. seravschanica* Rgl. et Schmalh.; 3 – *S. brachyantha* (Bordz.) Pobed. General aspect and details: flower, fruiting calyx, stamens, lower lip of corolla.



Annual, 15–40 cm high; stem erect, branched from base, the lower part much shorter than inflorescence, densely covered below with long 6–8-jointed hairs (the broad flat segments disposed in different planes) intermixed with long-stipitate large-headed glands; leaves oblong, elliptical, rarely ovate-oblong, (2) 3.5 (7) cm long, (1) 1.5 (2.8) cm broad, obtuse, cuneate or rounded at base, prominently veined on both sides, rugose, whitish beneath with a dense cover of short implexed hairs and, in lower part, with small short-stipitate glands, covered above, sparsely on the veins and more densely between them, with 3–4-jointed taeniate hairs, crenate, the petiole one-and-a-half times as long as the blade; middle leaves smaller, short-petioled; floral leaves rhombic-ovate, attenuate at apex, sessile or short-petioled, covered beneath and at margin with long 4–6-jointed hairs, between veins with short-stipitate glands; bracts long, linear, long-ciliate; terminal leaves above inflorescence sterile, ovate-oblong or elliptical, acute, larger than floral leaves, always tinged with violet or pink, glabrous above, appressed-puberulent beneath mainly in lower part and on veins; inflorescence simple, at ends of stems and branches; verticillasters 6–11, spaced 1–3 cm apart, 4–6-flowered; pedicels broad, thick, elliptical, densely covered with short appressed retrorse hairs and short-stipitate glands, pale violet, rarely pink and then terminal leaves also pink; calyx tubular, 13-ribbed, 9–11 mm long, covered on the ribs outside with long 3–4-jointed hairs and long-stipitate glands, between the ribs with short appressed retrorse hairs, inside in upper half sparsely puberulent; upper lip with asymmetrical lateral teeth, the inner margin of these horizontal and abruptly forming a deep notch, the small middle tooth inserted in the notch; lower lip with 2 larger lanceolate acute teeth; all teeth subulate-pointed; corolla one-and-a-half times as long as the calyx, 295 the tube prominently exserted; upper lip erect, slightly concave, covered outside with short implexed hairs; middle lobe of lower lip rounded-reniform, strongly concave, notched at apex, lateral lobes oblong, upright; upper anther-locules to 2 mm long, the lower dilated, rectangular, deeply notched below the middle; style long-exserted; lobes of stigma very unequal; nutlets dark brown, 3 mm long, 1.5 mm broad, ovoid-ellipsoid, smooth. Second half of April–August.

Dry, mainly calcareous, mountain slopes, steppe plots, roadsides, derelict fields. — European part: Crim. Gen. distr.: W., and E. Med., Bal.-As. Min., Arm-Kurd. Described from Greece. Type in London.

Note. This species is repeatedly confounded with *S. viridis* L., the reason being that the generally recognized distinguishing character is the one indicated by Linnaeus, namely the coloring of terminal leaves, violet-tinged in *S. horminum* and green in *S. viridis*. Reliable determination calls, however, for consideration of other characters as well. Thus, in *S. horminum*, the calyx is glandular-hairy, the corolla-tube long, exserted; in *S. viridis*, calyx is covered with simple long multicellular hairs, while corolla-tube is short, included in calyx. Both species occur in the Mediterranean region, but *S. viridis* much less frequently than *S. horminum*. In the U.S.S.R. the two species occupy different areas: *S. horminum* grows in Crimea, *S. viridis* in the Caucasus.

27. *S. viridis* L. Sp. pl. (1753) 24; M. B. Fl. taur.-cauc. I, 19; C. A. M. Verzeichn. 87; Eichw. Pl. nov. casp.-cauc. 24; Benth. Lab. Gen. et sp. 220; Ldb. Fl. Ross. III,

360; Benth. in DC. Prodr. XII, 277; Boiss. Fl. or. IV, 630; Shmal'g. Fl. II, 321; Coste, Fl. Franc. III, 101; Gams in Hegi, Ill. Fl. IV, 4, 2487; Grossg. Fl. Kavk. III, 319; Kudryash. Mat. k izuch. shalf. Sr. Az. 14. — *Horminum viride* Moench, Meth. pl. (1794) 377. — *S. viridis* L. var. *bicolor* O. Ktze. in Tr. Bot. sada, X (1887) 229. — Ic.: Desf. Fl. Atlant. I, tab. 1; Jacq. Ic. Pl. rar. I, tab. 4. — Exs.: Fl. Gr. No. 432, 434; Fl. Sic. No. 879.

Annual, 10–40 cm high; stem erect, simple or twice branched from base, with 1–3 pairs of branches, as long as or slightly longer or shorter than inflorescence, densely covering the whole length with long multicellular hairs (the flat segments of these disposed in different planes) intermixed in lower part with short appressed retrorse hairs; leaves oblong, elliptical or ovate-oblong, (1.5) 4 (5) cm long, (0.8) 2 (3.5) cm broad, obtuse, rounded or subcordate at base, crenulate, prominently veined beneath, rugose, whitish beneath with a dense cover of short implexed hairs and small short-stipitate glands in lower part, on both sides with scattered long 3–4-jointed taeniate hairs, sometimes with hair fascicles between the veins above; petioles of lower leaves long, dilated toward base, with indument as on stem; middle leaves smaller, short-petioled; floral leaves rhombic-ovate or ovate-oblong, attenuate at apex, sessile or short-petioled, covered beneath and at margin with long 4–6-jointed hairs, above with scattered short hairs; bracts long, linear, long-ciliate; terminal leaves sterile, much reduced, smaller than floral leaves, ovate or ovate-oblong, acute, green, often absent; inflorescences simple at ends of stems and branches; verticillasters 6–11, spaced 2–5 cm apart, 4–6-flowered; pedicels broad, thick, elliptical, densely covered with strict hairs of varying length and sometimes with short-stipitate glands; calyx tubular, 13-ribbed, 9–11 mm long, covered outside on the ribs with long 3–4-jointed hairs (these with a thick inflated basal segment) interspersed with short appressed retrorse hairs, sparsely puberulent inside in upper half; lateral teeth of upper lip asymmetrical, their inner margin half-rounded, descending into a deep notch, the minute middle tooth inserted in the notch; lower lip 2-toothed, the teeth larger, lanceolate, acute; all teeth subulate-pointed; corolla violet, with nearly white lower lip, one-and-a-half times as long as calyx; corolla-tube included in calyx; upper lip erect, slightly incurved, covered outside with short implexed hairs; middle lobe of lower lip rounded-reniform, deeply concave, notched at apex, lateral lobes oblong, upright; upper anther-cells to 2 mm long, the lower dilated, rectangular, deeply notched below the middle; style long-exserted; lobes of stigma very unequal; nutlets dark brown, 3 mm long, 1.5 mm broad, ovoid-ellipsoid, smooth. May–August.

Dry stony slopes, dry fields. — Caucasus: throughout. **Gen. distr.:** W. and E. Med., Bal.-As. Min. Described from specimens cultivated in the Frankfurt Botanical Garden, of unknown provenance. Type in Leningrad.

**Note.** There are indications of occurrence in Central Europe; this may be regarded as a consequence of cultivation in the 17th century. *S. viridis* was grown as an undemanding ornamental and nectariferous plant. Nowadays occurring much less frequently in cultivation.

297 28. *S. intercedens* Pobed. sp. n. in Addenda XX, 657. — *Salvia viridis* auct. fl. As. Med.

Annual, 8–30 cm high; stem erect, branched all the way up, much shorter than inflorescence, densely covered below with 6–8-jointed hairs (the broad flat segments all in one plane) and long-stipitate large-headed glands or short appressed hairs, more profusely glandular-hairy in inflorescence; leaves elliptical, 1–3 cm long, 0.8–1.5 cm broad, cuneate at base, slightly pubescent or almost whitish with a dense cover of short implexed hairs and small short-stipitate hairs, covered above with scattered 3–4-jointed taeniate hairs or with fascicled hairs between veins, crenate, the petiole as long as or slightly shorter than blade; middle leaves small, short-petioled; floral leaves rhombic-ovate, attenuate at apex, sessile or short-petioled, covered beneath and at margins with long 4–6-jointed hairs and short-stipitate glands, with sparse short hairs above, with a pair of long linear long-ciliate stipules; terminal leaves above inflorescence absent or very small, much smaller than floral leaves, similarly hairy, green; inflorescence simple, at ends of stems and branches; verticillasters 7–9, spaced 1–2 cm apart, 4–6-flowered; pedicels broad, thick, elliptical, densely covered with short appressed hairs intermixed with long multicellular hairs and long-stipitate glands; calyx 13-ribbed, 10–12 cm [sic] long, covered outside on the ribs with long 3–4-jointed hairs and long-stipitate glands, between the ribs with short appressed retrorse hairs, inside in upper half sparsely puberulent; lateral teeth of upper lip asymmetrical, the horizontal inner margin abruptly terminating in a deep nerve [?], the very small middle tooth inserted in the apical notch; lower lip 2-toothed, the teeth larger, lanceolate, acute; all teeth subulate-pointed; corolla pale violet, with almost white lower lip, one-and-a-half times as long as calyx, the tube included in calyx; upper lip erect, slightly concave, covered outside with short implexed hairs, the middle lobe rounded-reniform or transversely elliptical, deeply concave, emarginate, the lateral lobes oblong, strict; upper anther-locules to 2 mm long, the lower dilated, rectangular, deeply notched below the middle; style exserted; 298 lobes of stigma very unequal; nutlets ovoid-ellipsoid, dark brown, 3–3.25 mm long, smooth. July. (Plate XVII, Figure 2.)

Dry stony and grassy slopes; as weed in fields. — Centr. Asia: Mtn. Turkm. **Gen. distr.:** W. and E. Med., Bal.-As. Min., Iran. Described from W. Kopetdag. Type in Leningrad.

**Note.** A species intermediate between *S. horminum* and *S. viridis*, clearly of hybrid origin, which probably arose in an area where the two parent species grow side by side (Middle East, S. Europe), and has penetrated into areas where the parent species are to be found (E. Iran, Turkmenia). As regards other hybrid forms produced by these species, displaying other combinations of characters, the occurrence is rare and sporadic in areas of cohabitation of the parent species.

**Economic importance.** The flowers contain an essential oil (V.A. Vyshenskii. Dobycha mekhanicheskogo syr'ya na baze rastit. resurs. i spetsial. sel'sk. khozyaistva Turkmenistana. Sb. "Zemledel'cheskaya Turkmeniya," izd. VIR, 1935). The plant investigated appears under the name *S. viridis* L.

Section 2. *Stenarrhena* (Don) Briq. in Pflanzenfam. IV, 3a, 3b (1897) 274. — *Stenarrhena* D. Don, Prodr. Fl. Nep. (1825) 111. — *Aethiopis* (sect.) Benth. Lab. Gen. et sp. (1832–1936) 222. — *Aethiopis* Benth. in Hook. Bot. Misc. 3 (1833)



373. — Calyx campanulate, cleft less than halfway to base, tubular, conical or tubular-campanulate, not or very slightly accrescent, the upper lip not truncate, 3-toothed, the teeth erect, subconnivent, equilateral, the middle tooth often very small; corolla large, rarely small; upper lip of corolla exceeding the lower, rarely suberect, curved; floral leaves exstipulate; flowers predominantly yellow and white. Perennial herbs.

Subsection 1. Homalosphaceae (Bge.) Briq. in Pflanzenfam. IV, 3a, 3b (1897)

274. — Homalosphaceae Bge. Lab. pers. (1873) 49; Boiss. Fl. or. IV, 592. — Corolla-tube gradually dilated toward throat; nectaries absent; upper stamens staminodial.

Series 1. *Syriacae* Pobed. — Calyx campanulate; upper lip of corolla falcate, compressed laterally; corolla-tube included in calyx; indument villous; flowers 8–12 mm long; stipules absent; inflorescence paniculate.

29. *S. syriaca* L. Sp. pl. (1762) 36; Falk, Beitr. II, 99; Georgi, Besch. d. Russ. R. 299 III, 4, 658; Benth. Lab. Gen. et sp. 223; Hohen. in Bull. Soc. Nat. Mosc. III, 294; Ldb. Fl. Ross. III, 361; Benth. in DC. Prodr. XII, 279; Boiss. Fl. or. IV, 640; Grossg. Fl. Kavk. III, 319. — *S. varia* Vahl, Enum. I (1805) 273. — Ic.: Post. Fl. Syr., Pal. a. Sin. (1896) 630. — Exs.: Fl. Palaes. No. 171.

Perennial, 30–50 cm high; stem erect, simple, about as long as or longer than inflorescence, villous-hairy the whole length, in inflorescence also with longer hairs as well as long- and short-stipitate glands; lower cauline leaves oblong-ovate, (5.5) 6 (16) cm long, (3.4) 4.5 (9.5) cm broad, obtuse or acute, cordate, rugose, slightly erose-dentate, villous on both sides, the lower side also with very short glandular hairs and golden sessile glands, the petiole one-third the length of blade, channeled above, villous; middle cauline leaves smaller, with shorter petiole, upper cauline smaller again, sessile; floral leaves very small, broader than long, nearly semiorbicular, short-acuminate, sessile, clasping, densely covered on both sides with short appressed simple white hairs intermixed with short-stipitate glands, equaling or exceeding the pedicels; inflorescence paniculate, with 7–11 branches, these long, often exceeding the main stem, twice to three times divaricately branched; verticillasters 1.5–2.5 cm apart, 2–6-flowered; pedicels 3–5 mm long, unequal, with dense short hairs; calyx campanulate, 6–10 mm long, prominently 10–12-nerved, densely covered outside with short simple hairs and short-stipitate glands, inside with scattered short simple hairs and in upper half with profuse short glandular hairs; upper lip about as long as the lower or slightly shorter, with short subequal lanceolate teeth, the lower lip more deeply 2-toothed; all teeth point-tipped, hairy nearly to apex; corolla white, 8–12 mm long, the tube included in calyx; upper lip of corolla slightly curved, compressed laterally, covered with short simple hairs and short-stipitate glands; middle lobe of lower lip broadly obovate, notched at apex, strongly concave, lateral lobes oblong, strict; stamens exerted from under upper lip, the lower sterile anther-locule scarious, rectangular, deeply notched at the middle;

connective above the sterile anther with a long filiform descending process; upper stamens reduced to very short small-headed staminodes; style prominently exserted; lobes of stigma unequal; nutlets broadly ellipsoid, trigonous, 2.5–3 mm long, yellowish, brown-reticulate. April–July.

- 300 Dry mountain slopes, mountain meadows, and weed-infested places. — Caucasus: S. Transc., Tal. Gen. distr.: E. Med., Arm.-Kurd., Iran. Described from “the Orient” (probably from Syria). Type in London.

Note. The old report for Terek, contributed by Falk, has not been confirmed by later collections and is probably wrong. This is essentially an Iranian species which does not occur to the north of Armenia and Talysh. Another species that should be referred to this series is the Syrian *S. montbretii* Benth.

Series 2. *Spinosae* Pobed. — Calyx tubular or conic-tubular; upper lip of corolla erect or slightly curved; corolla-tube prominently exserted; indument including taeniate hairs; flowers large, 2–2.5 cm long; bracts absent; inflorescence paniculate.

30. *S. spinosa* L. Mant. II (1771) 511; Spreng. Syst. veg. I (1825) 64; Benth. Lab. Gen. et sp. 224; Benth. in DC. Prodr. XII, 281; Boiss. Fl. or. IV, 613; O. and B. Fedch. Perech. rast. turk. V, 134; Kudryash. Mat. k izuch. shalf. Sr. Az. 15. — *S. doryphora* Stapf, Ergebn. d. Polak. Exped. nach Persien (1883) 41. — *S. distincta* Grossh. in Vestn. Tifl. bot. sada, 35 (1914) 1. — *S. gusarica* M. Pop. in Schedis. — Ic.: Jacq. Ic. Pl. rar. I, tab. 7.

- Perennial, 20–60 cm high; stem erect, slightly branched, covered with 2–4-jointed hairs (the broad flat segments disposed in one plane) intermixed with long-stipitate glands, more copiously glandular-hairy in inflorescence; radical and lower cauline leaves ovate or broadly elliptical, (6) 9 (16) cm long, (2.5) 4.5 (11) cm broad, obtuse, subcordate or cuneate at base, twice bluntly erose-dentate to sublobate, rugose, covered on both sides (more sparsely above) with taeniate hairs intermixed with fine implexed hairs and scattered short-stipitate glands; petioles 4–6 cm long; cauline leaves smaller, more sharply and deeply undulate-incised, less rugose, sessile; floral leaves falcately rounded, abruptly terminating in a small spinous point, green, strongly concave, overlapping, smaller than leaves subtending inflorescence branches, equaling or shorter than calyx, long-ciliate, covered beneath with long taeniate hairs, with very short appressed hairs above; inflorescence an open pyramidal panicle, the branches with 5–7 verticillasters, 1.5–3.5 cm apart, 6-flowered, the terminal always sterile; pedicels 2–4 mm long; calyx conical, 15–20 mm long, prominently ribbed in fruit, covered on the
- 301 nerves with long fine multicellular hairs intermixed with taeniate hairs and sparse long-stipitate glands, between the nerves with numerous subsessile glands; middle tooth of upper lip shorter than the lateral teeth, these lanceolate, somewhat connivent; lower lip 2-toothed, the teeth longer, lanceolate; all teeth with a short rigid spinous point; corolla white, 2–2.5 cm long; upper lip of corolla suberect, slightly curved; lateral lobes of lower lip straight, oblong, middle lobe obovate, emarginate, unevenly toothed at margin, strongly concave; stamens and style exserted, the connective at the end of

the short lower arm with sterile anther-locule; upper stamens reduced to small staminodes with arched sterile anther; lobes of stigma very unequal; nutlets trigonous-globose, 2.5 mm long, greenish-gray, brown-reticulate, lustrous. April–July.

Gravelly-clayey slopes, foothill steppes, and stony deserts. — Caucasus: S. Transc.; Centr. Asia: Mtn. Turkm., Syr D., Pam.-Al. **Gen. distr.:** E. Med., Iran (W.). Described from Egypt. Type in London.

**Economic importance.** The yield of oil from plants distilled after flowering amounted to 0.19%. The oil has an agreeable scent, reminiscent of that of Clary sage; it is heavier than water and water-soluble. (Kudryashev, Dikorast. efirno-maslichn. rast. tsentral'n. chasti Gisarsk. khrebta, 1932, 56.) The oil is localized in inflorescences; its composition varies in different plant parts (Strepkov, in Tr. Uzb. Gos. univ. IX, 1937).

31. *S. nachiczewanica* Pobed. sp. n. in Addenda XX, 657. — *S. kotschyi* Grossh. in Tr. Bot. inst. AzFAN SSSR (1936) 245, non Boiss.

Perennial, upward of 30 cm high, with a stout woody root; stems several, erect, simple, leafy, covered from base with scattered long fine hairs intermixed with long-stipitate glands, in inflorescence densely covered with long glandular hairs; radical leaves elliptical, 2–4.5 cm long, 1.2–2 cm broad, rounded at base, obtuse, crenate, rugose, covered on both sides with long fine implexed hairs, here and there tomentose, and with a lining of short-stipitate glands; petioles twice to three times the length of blade, covered with long fine multicellular hairs and long-stipitate glands; cauline leaves gradually decreasing in size, suborbicular, the petiole shorter than blade, dilated at base, densely covered with long simple and glandular hairs, the upper sessile, acute, sharply dentate; upper floral leaves smaller than the lower, shorter than calyx, broad-ovate, subulately short-pointed, sessile, clasping, entire, covered beneath with short-stipitate glands, the margin long-ciliate with simple multicellular hairs, the upper side with scattered long simple hairs or subglabrous; inflorescence paniculate; verticillasters 1.5–2 cm apart, 2–4-flowered, the terminal sterile; pedicels 1–2 mm long, slightly pubescent; calyx tubular-campanulate, 15–17 mm long, covered outside with long fine multicellular hairs and few long-stipitate glands, covered inside all over with short appressed hairs; upper lip of calyx with 3 shortly subulate-pointed teeth, the middle lobe shorter than the lateral; lower lip with slightly longer ovate acuminate teeth; corolla 2.5 cm long, the tube 1.5 cm long, glabrous inside, long-exserted; upper lip of corolla shorter than or equaling the lower, suberect; lateral lobes of lower lip erect, oblong, middle lobe broadly obovate, deeply concave; stamens and style exserted; upper stamens staminodial, with arched sterile anther; lobes of stigma very unequal; nutlets unknown. June.

Stony rocks. — Caucasus: S. Transc. (Nakhichevan' ASSR). Endemic. Described from Diza-Chai. Type in Leningrad.

Note. Grossheim (op. cit.) equates this species with *S. kotschyi* Boiss. Examination of the specimen collected by Prilipko near the river Diza-Chai in Nakhichevan' has shown that it does not conform to *S. kotschyi* Boiss. described from Shiraz and so closely approaching *S. macrosiphon* Boiss. that later (1879) Boissier accepted it



as a variety of *S. macrosiphon* (which, in our view, is incorrect), but shows close affinity to *S. spinosa* L. as regards both distribution area and morphological characters.

The new species is distinguishable from *S. spinosa* by the glandular-hairy underside of its floral leaves, the suborbicular floccose-hairy cauline leaves, and the indument of calyx with a higher proportion of glandular hairs.

32. *S. macrosiphon* Boiss. Diagn. ser. I, 5 (1844) 11; Benth. in DC. Prodr. XII, 282; Boiss. Fl. or. IV, 615; O. and B. Fedch. Perech. rast. Turk. V, 134; Kudr. Mat. k izuch. shalf. Sr. Az. 14. — *S. kotschyi* Boiss. Diagn. ser. I, 7 (1846) 46. — *S. macrosiphon* var. *kotschyi* Boiss. Fl. or. IV (1879) 615.

Perennial, 30–50 cm high; stems several, erect, branched nearly from base, covered  
303 with long multicellular hairs (the broad flat segments of these disposed in different planes), fine appressed crisp hairs, and long- and short-stipitate glands, in inflorescence densely covered with short-stipitate glands and widely scattered 2-jointed hairs with inflated basal segment, radical and lower cauline leaves ovate-oblong, (5.5) 10 (14) cm long, (3) 5 (8) cm broad, obtuse, subcordate or cuneate at base, doubly and sharply erose-dentate, canescent on both sides with fine implexed hairs and numerous short-stipitate glands, the petiole usually shorter than blade, covered with fine implexed and long multicellular hairs; cauline leaves small, sessile; floral leaves broad-ovate, long-acuminate, terminating in a long soft non-spinous point, sessile, amplexicaul-decurrent, entire, shorter than calyx, covered on veins beneath and at margin with scattered short 2-jointed hairs with inflated basal joint, with short-stipitate glands between the veins and often on upper surface; lower floral leaves larger than the upper; inflorescence paniculate, pyramidal, open; verticillasters 4–10, spaced (2) 3 (5) cm apart, 2–4-flowered, the upper always sterile; flowers on pedicels 1–2 mm long or subsessile; calyx tubular, 15–20 mm long, narrow, covered on the nerves outside with short sharp hairs inflated at base, between the nerves with numerous short-stipitate glands, inside in upper two-thirds with very short papilliform hairs; upper lip with approximate lateral teeth, the middle tooth shorter; lower lip bidentate, with longer lanceolate teeth; all teeth terminating in a long fine soft point; corolla white, 2.5–3 cm long, the tube prominently exserted; upper lip erect, scarcely curved, narrow, emarginate, glabrous; middle lobe of lower lip broad, strongly concave, slightly notched, with toothed margin, lateral lobes oblong, acuminate, erect; stamens and style prominently exserted; sterile anther-locules rectangular, scarious; upper stamens reduced to short staminodes with arched sterile anthers; nutlets trigonous, broadly ellipsoid, 2.5–3 mm long, light brown, with darker reticulation, shiny. June.

Gravelly and loess slopes, stony valleys, in foothills at the bottom of dry streams. — Centr. Asia: Syr D., Pam.-Al., T. Sh. Gen. distr.: Iran. Described from S. Iran. Type in Geneva.

Note. Central Asian plants that we have included in this species differ somewhat from the south-Iranian specimens collected at the classical location, the distinguishing  
304 features being associated with the indument; this consists of the stem of copious long taeniate hairs (not short appressed) and, in inflorescence, of numerous short-stipitate glands and scattered short thick-based hairs (not short appressed hairs intermixed with short-stipitate glands).

The specimen collected in 1912 by S. S. Neustruev in Shirabad Valley differs from *S. macrosiphon* in floral leaves being violet-tinted, gradually attenuate and exceeding calyx, resembling those of *S. sclarea*, but otherwise retaining the features of *S. macrosiphon*. It may perhaps be a hybrid of *S. macrosiphon* × *S. sclarea* parentage.

**Economic importance.** The yield of essential oil from inflorescences at flowering time amounts to 0.19%. Upon drying, the plants lose about 80% of their essential oil content. The yield of cultivated plants fluctuates between 3 and 8 kg of essential oil per hectare (Isaev in Tr. Tadzh. bot. sada, No. 1, 1932).

Series 3. *Comparia* Pobed. — Calyx campanulate; upper lip of corolla falcate; corolla-tube exserted; indument comprising short eglandular hairs with swollen segments; flowers 2–2.5 cm long, with linear ciliate bracts; inflorescence simple or sparingly branched.

33. *S. compar* Trautv. ex D. Sosn. in Tr. Az. FAN SSSR, I (1933) 43 (nomen restituendum); Yuzepch. in sched.; Lipskii, Fl. Kavk. 420; Grossg. Fl. Kavk. III, 321. — *S. sahendica* auct. fl. cauc., non Boiss. et Buhse; Trautv. in Tr. Bot. sada, V, 2 (1878) 468 and IX, 95; Boiss. Fl. or. IV, 62, p. p.; Bordz. in Zap. Kievsk. obshch. estestv. XXV, 113. — *S. trautvetteri* D. Sosn. in Vestn. Tifl. bot. sada, 1 (1923) 79, non Rgl. — *S. sahendica* Boiss. et Buhse ssp. *compar* Wissjulina in Bull. Jard. Bot. de Kieff IX (1929) 103.

Perennial, 20–45 cm high; stem simple, rarely slightly branched, erect or ascending, longer than inflorescence, rarely as long, uniformly leafy, with 4–7 pairs of leaves, covered all along with short thick-based appressed retrorse hairs, these intermixed in inflorescence with short-stipitate glands; radical leaves none; lower cauline leaves elliptical, (3) 6 (7.5) cm long, (1.5) 3 (4) cm broad, obtuse to subacute, cordate or rounded at base, finely and closely crenate, strongly rugose, glabrous above with scattered hairs on the midvein, canescent beneath copious short patent hairs and sometimes with few short-stipitate glands, the petioles shorter or rarely as long as blade, dilated at base, densely covered with short appressed and longer multicellular thickened hairs; middle cauline leaves smaller, short-petioled; lower floral leaves sessile, long-acuminate; upper floral leaves scarious, suffused with pink or pinkish-violet, ovate, long-acuminate, sessile, clasping, glabrous above, with short appressed pubescence beneath, with long-ciliate revolute margin; inflorescence simple or with 1 or rarely 2 pairs of short slender branches at base; verticillasters 6–10, distant, 2–6-flowered, the terminal sterile; pedicels densely puberulent, recurved in fruit; bracts 5–6 mm long, linear, scarious, white, ciliate; calyx 10–11 mm long, elongating in fruit to 15–16 mm, covered outside with short thick-based hairs on the nerves, with short glandular hairs between them, copiously covered inside in upper half with short-stipitate glands, drooping, readily falling off in maturity, the teeth long-subulate, pubescent in fruit; corolla azure or violet, 2–2.5 cm long, the exserted tube markedly expanding; upper lip falcate, with scattered short hairs on the back; lower lip with broadly obovate middle lobe and strict elliptical lateral lobes; stamens and style slightly exserted;

upper stamens staminodial; sterile anther-locules oblong, 2 mm long; lobes of stigma unequal; nutlets trigonous-ellipsoid, 3 mm long, brown with darker reticulation; the whole plant profusely covered with sessile orange glands. June—July. (Plate XIV, Figure 2.)

Stony slopes and riverside rocks. — Caucasus: E. Transc. Endemic. Described from Akhaltsikh. Type in Leningrad.

Note. This species closely approaches the Iranian *S. sahendica* and has been repeatedly confounded with it; some botanists (e.g., F. Bordzilovskii, op. cit.) do not recognize any differences between the two species. However, *S. compar* is readily distinguishable in having more profusely branched stem and inflorescence, a more elongated narrow calyx (10–11 mm long and not 9–10 mm, in fruit 15–16 mm as against 14 mm in *S. sahendica*), flowers azure or violet (not dingy yellow), corolla-tube exserted (not included in calyx), and nutlet light brown to almost yellow. *S. compar* and *S. sahendica* are two vicarious species of the same genetic series. A third species of the same series was described by Bunge from Khorasan, under the name *S. chorassanica* Bge. The species published by Trautvetter as *S. compar* had first been established by S.V. Yuzepchuk in 1923, as evidenced by labels in the herbarium of the Institute of the Academy of Sciences of the U.S.S.R., but Yuzepchuk's work was not published. In the same year of 1923, Sosnovskii described this plant as a new species *S. trautvetteri*, overlooking the fact that this appellation had already  
306 been adopted by Regel for another (Central Asian) plant. It was only in 1933 that Sosnovskii reaffirmed the name coined by Trautvetter.

Series 4. *Seravschanicae* Pobed. — Calyx tubular; upper lip of corolla slightly curved; corolla-tube prominently exserted; stem and leaves tomentose; flowers 2–3 cm long, ebracteate; inflorescence simple or with two pairs of branches.

34. *S. seravschanica* Rgl. et Schmalh. in Izv. obshch. lyub. est. antrop. i etnogr. XXXIV, 1 (1881) 62; Kudr. Mat. k izuch. shalf. Sr. Az. 18. — *S. capusii* Franch. Pl. du Turk. Miss. Capus (1883) 135.

Perennial, 15–30 cm high; root woody, vertical, nearly as long as the whole plant; stems simple, solitary or sometimes paired, as long as or shorter than inflorescence, tomentose, in lower part of inflorescence with sparser tomentum intermixed with long-stipitate glands, in inflorescence with short hairs thickened at base, interspersed with long- and short-stipitate glands; leaves mostly radical, oblong-elliptical or elliptical, (5) 7 (8) cm long, (1.5) 2.2 (3) cm broad, rounded at base, obtuse, bluntly short-toothed or subentire, rugose, green and sparingly pubescent above, densely white-tomentose beneath, with translucent golden sessile glands, the petioles about as long as blade, tomentose; middle cauline leaves usually 1 pair, smaller, short-petioled; upper cauline and lower floral leaves lanceolate, sessile, all white-tomentose; upper floral leaves often violet-tinged, large, equaling or exceeding the calyx, scarious, broad-ovate, abruptly short-acuminate, tomentose, with sessile glands, the uppermost hispid on veins and margins, elsewhere with very small short-stipitate glands, at apex tomentose;



inflorescence simple or branched, with 2 pairs of lateral branches, fairly compact; verticillasters 0.5–1 cm apart, the lowest at a distance of 1 cm, 2–4- or very rarely 5–6-flowered; calyx tubular, 16–20 mm long, white-scarious at base, distinctly ribbed, hispid on the ribs, with short-stipitate glands between the ribs, covered inside with short simple hairs; middle tooth of upper lip slightly shorter than the lateral upright teeth; lower lip with 2 slightly longer lanceolate teeth; all calyx-teeth terminating in a long subulate pubescent point; corolla pale-violet, 2–3 cm long, the tube prominently exserted; upper lip of corolla narrow, slightly falcate, truncate and emarginate at apex, covered above (especially at apex) with bristly hairs and sessile glands; lower lip with elliptical short-pointed lateral lobes, the middle lobe broadly obovate, slightly concave; stamens exserted; sterile anther-locules rectangular, scarious; upper stamens reduced to short large-headed staminodes; style long-exserted, puberulent; lobes of stigma broad, violet, very unequal; nutlets 2 mm in diameter, globose, flattened, greenish-brown, with dark-brown reticulation. May–June. (Plate XV, Figure 2.)

Granite outcrops, in dry stony river beds. — Centr. Asia: Pam.-Al. Endemic. Described from Zeravshan Valley (Sangy-Dzhuman). Type in Leningrad.

**Economic importance.** Essential oil obtained from wild plants at full bloom, at the rate of 0.012%, and steam-distilled in fresh condition, has been found to constitute a dense pale yellow liquid with disagreeable odor (Strepkov in Tr. Uzb. Gos. univ. IX, 1937).

35. *S. gontscharovii* Kudr. in Bot. zhurn. SSSR, 23, 5–6 (1938) 409. — Ic.: op. cit., Figure 1.

Perennial, 25–50 cm high, with a long, rather slender, vertical root; stems solitary, rarely 2 or 3, half the length to length of inflorescence, covered, mainly on the ribs, with scattered short fine hairs, on the faces with short-stipitate glands, the branches in upper part of inflorescence also with long-stipitate glands; radical leaves 12–15 cm long, 5–10 cm broad, ovate or broadly elliptical, obtuse, rounded or subcordate at base, erose-dentate, smooth, sparsely pubescent and with numerous sessile glands at the angles of veins beneath, with sparse short hairs above, with more numerous hairs on the veins, the petiole as long as or longer than blade, tomentose at base; cauline leaves smaller, short-petioled; lower floral leaves small, ovate, rugose, sessile, pubescent on the veins beneath; upper floral leaves broad-ovate, as long as calyx, in fruit equaling the calyx-tube, sessile, clasping, short-acuminate, concave, scarious, white or violettinged, bristly-ciliate, the lower side with scattered short hairs and few sessile glands; inflorescence branched; verticillasters 2.5–3 cm apart, 4- or rarely 2-flowered; calyx tubular-campanulate, 18–20 mm long, prominently 12-nerved, hispid on the nerves, with short-stipitate glands between them; upper lip with 3 short connivent teeth, the middle shorter than the lateral; lower lip with 2 slightly longer lanceolate teeth; all teeth finely subulate-pointed, the points also pubescent; corolla white or pale-violet, 28–30 mm long, with strongly exserted tube; upper lip narrow, erect, emarginate, puberulent outside; lateral lobes of lower lip narrow, strict, long, nearly as long as upper lip, middle lobe broad, suborbicular, slightly concave; stamens exserted; sterile anther-locules narrowly oblong; upper stamens staminoid; style slightly exserted;

lobes of stigma unequal; nutlets ellipsoid, obscurely trigonous, 3 mm long, greenish-brown with darker reticulation. May–June.

Gypsiferous deluvia of red sandstone. — Centr. Asia: Pam.-Al. Endemic. Described from River Vakhsh valley (Puli-Sangin bridge). Type in Leningrad.

Series 5. *Canescentes* Pobed. — Calyx campanulate; upper lip of corolla slightly curved; corolla-tube included in calyx; leaves and stems tomentose; flowers 1.5–2.5 cm long, ebracteate; inflorescence simple or with 1 or 2 pairs of branches.

36. *S. canescens* C. A. M. Verzeichn. (1831) 86; Benth. in DC. Prodr. 287; Ldb. Fl. Ross. 362; Boiss. Fl. or. IV, 612; Shmal'g. Fl. II, 318; Grossg. Fl. Kavk. III, 319. — Ic.: Bot. Reg. XXIV (1838) tab. 36. — Exs.: GRF, No. 784; Herb. Fl. Cauc. No. 98 and No. 388.

Perennial, 10–35 cm high; rhizome woody, branching; stem ascending, simple, as long as or shorter than mature inflorescence, covered below with long slender implexed hairs, in inflorescence with long multicellular hairs and long-stipitate glands; radical leaves numerous, oblong or oblanceolate, (2.5) 3 (18) cm long, (0.4) 1.2 (6) cm broad, attenuate at base, acute, white-tomentose on both sides, more heavily so beneath, sinuate-lobate, rarely entire, decurrent, the petiole shorter than to as long as blade, dilated at base, tomentose; cauline leaves 1 or 2 pairs or absent, shorter and narrower than the radical; lower floral leaves oblong-lanceolate, acute, sessile, clasping, tomentose beneath, greenish with arachnoid pubescence above; upper floral leaves broader than long, transversely ovate, obtuse to short-pointed, shorter than calyx, the lower side arachnoid-pubescent or tomentose toward apex, the upper side and margins with long fine multicellular hairs; inflorescence simple or with 1 or 2 pairs of branches, 309 these not reaching the summit of rachis; verticillasters 4–6, spaced 1–3 cm apart, the lower 5–8 cm apart, 4–6-flowered; pedicels pubescent, 2–3 mm long; calyx campanulate, 8–10 mm long, prominently 13-nerved, covered with long fine hairs and few long-stipitate glands, the upper lip slightly longer than the lower, with very small widely separated teeth, the lower lip with 2 large fine-pointed lanceolate teeth; corolla violet, 1.5–2.5 cm long, the tube included in calyx, the lips with long fine hairs and short-stipitate glands on the back; upper lip much longer than the lower, slightly curved; middle lobe of lower lip transversely elliptical, emarginate, deeply concave, lateral lobes oblong or elliptical; stamens and style exserted; sterile anther-locules with prominent obtuse apical appendage; nutlets trigonous-ellipsoid, 2.5 mm long, smooth, castaneous with darker reticulation. May–July.

Calcareous mountain slopes. — Caucasus: Cisc., W. Transc. Endemic. Described from Kislovodsk. Type in Leningrad.

37. *S. daghestanica* Sosn. in Zam. po sistem. i geogr. rast. Tbil. bot. inst. AN GruzSSR, 16 (1951) 8. — *S. canescens* auct. fl. Cauc. non C. A. M. quoad pl. e Caucaso centrali et orientali atque Daghestaniae. — Exs.: Herb. Fl. Cauc. No. 388; GRF, No. 784; Fl. Cauc. exs. No. 98.

Perennial, (7) 10 (22) cm high; rhizome branching, woody; stem erect, simple, rarely divaricately branched, shorter to as long as or rarely longer than inflorescence, tomentose below, in inflorescence with long fine multicellular hairs and long-stipitate glands; leaves mostly radical, oblong or oblong-spatulate, (2) 3.5 (10) cm long, (0.4) 0.5 (1.5) cm broad, obtuse, gradually attenuate toward base and passing into narrowly winged petiole, subentire, rarely with distant obtuse teeth, niveous-tomentose on both sides; cauline leaves 1 or rarely 2 pairs, shorter and narrower, sessile, similarly tomentose; floral leaves broad-ovate, often broader than long, obtuse to short-pointed, shorter than calyx, the lower densely white-tomentose, the middle and upper with fine hairs or white-tomentose beneath, the margin with long-stipitate glands; inflorescence simple; verticillasters 3–6, spaced at 1–1.5 cm, the lower at 2–2.5 cm apart, 5–6-flowered; pedicels 2–3 mm long, pubescent; calyx campanulate, 6–7 mm long, prominently 12–13-nerved, covered outside with long fine and long-stipitate glands, inside in upper part with very short glandular hairs, the upper lip about as long as the lower, with 3 very short inconspicuous widely separated teeth, the lower with 2 larger lanceolate teeth, all teeth point-tipped; corolla blue, 14–17 mm long, the tube included in calyx; upper lip suberect, somewhat concave dorsally, with long fine hairs and short-stipitate glands; middle lobe of lower lip cordate, emarginate, deeply concave, lateral lobes oblong or elliptical; stamens and style exserted; sterile anther-locules narrow, oblong, with prominent apical appendage; nutlets trigonous-globose, 2 mm long, light-brown with darker reticulation.

Dry stony slopes and middle and upper mountain zones. — Caucasus: Cisc., Dag. Endemic. Described from Dagestan. Type in Tbilisi.

Subsection 2. *Gongrosphaceae* Briq. in *Pflanzenfam.* IV, 3a, 3b (1897) 275. — *Gongrosphaceae* (sect.) Boiss. *Fl. or.* IV (1879) 615. — *Aethiopis* (sect.) Benth. *Lab. Gen. et sp.* (1833) 222, p. p. — Corolla-tube abruptly dilated at throat and here with a small nectary-scale, this with glandular hairs at upper margin; staminodes usually absent, rarely present.

Series 1. *Sclareae* Pobed. — Radical and cauline leaves well developed, entire; floral leaves colored (pink, pale violet, rarely white), much longer than calyx; flowers 2–3 cm long; inflorescence paniculately branched.

38. *S. sclarea* L. *Sp. pl.* (1753) 27; *M. B. Pl. taur-cauc.* I, 22; Benth. *Lab. Gen. et sp.* 224; Ldb. *Fl. Ross.* III, 361; Benth. in DC. *Prodr.* XII, 281; Boiss. *Fl. or.* IV, 616; Shmal'g. *Fl.* II, 318; Grossg. *Fl. Kavk.* II, 320; Kudr. *Mat. k. izuch. shalf. Sr. Az.* 16. — *S. sclarea* L. var. *turkestaniana* Mott. in *Rev. Hort.* (1907) 134 (hort.). — *S. sclarea* L.  $\beta$ . *tomentosa* Rgl. in *Tr. Bot. sada*, VI (1879) 358. — *Sclarea vulgaris* Mill. *Gard. Dict.* (1768) No. 1. — *Ic.*: *Rchb. Ic. fl. Germ.* XVIII, tab. 1249. — *Exs.*: *HFAM*, No. 220.



311 Perennial, 20–120 cm high; stem erect, simple, longer than inflorescence, densely covered from base with thick implexed multicellular hairs and short-stipitate glands interspersed with few long-stipitate glands, on upper internodes with more numerous glandular and fewer multicellular hairs, in inflorescence with copious short- and long-stipitate glands and few scattered multicellular hairs; lower and middle cauline leaves (5.5) 10 (32) cm long, (5) 6.5 (22) cm broad, ovate or ovate-oblong, acute to subobtusate, subcordate, erose-dentate, rugose, covered with short thick hairs, between the veins above and on the veins beneath with short-stipitate glands and profuse sessile orange glands, the petiole as long as or longer than blade, with indument as on stem; radical leaves smaller, marcescent; upper cauline leaves smaller than the middle, short-petioled; lower floral leaves sessile, broad-ovate, clasping, short-acuminate; upper floral leaves one-and-a-half times as long as calyx, scarious, usually completely covering the verticillasters, later spreading, pinkish or white with green margin, suborbicular, sessile, abruptly attenuate toward apex, short-pointed; inflorescence paniculately branched, rarely simple or sparingly branched; verticillasters 2–6-flowered, the terminal sterile; pedicels 2–4 mm long, densely covered with long-stipitate thick-based hairs and short-stipitate glands interspersed with few long multicellular eglandular hairs; calyx 10–12 mm long, prominently ribbed, covered on the ribs with short thick 2–3-jointed hairs and few long-stipitate glands, with short-stipitate glands elsewhere, the upper lip recurved (especially in fruit), with widely separated teeth, the middle tooth shorter, lower lip with 2 longer teeth, all teeth subulately long-pointed, the points pubescent; corolla twice to three times as long as calyx, pinkish, lilac or white, the rounded membranous scale at throat 1.5 mm long and as broad, densely pubescent at margin; upper lip of corolla falcate, emarginate, covered on the back with short thick-based hairs, these intermixed with short-stipitate and numerous sessile orange glands; middle lobe of lower lip broadly obovate, deeply concave, lateral lobes oblong, obtuse, usually twisted; stamens and style violet-tinged, showing through corolla and imparting to it a faint violet color; sterile anther-locules scarious, rectangular; stigma exserted; anthers prominently exserted above upper lip or included; one of the stigma lobes 2–3 times as long as the other; nutlets ellipsoid, 2–3 mm long, brown with darker reticulation. Fl. June–July; fr. August–September.

312 Clayey, loess, silty or finely gritty mountain slopes, sands, plowed fields, and gardens, cultivated and sometimes a weed. — European part: Bl., Crim.; Caucasus: Dag., W. Transc. (Batumi), E. and S. Transc., Tal.; Centr. Asia: Balkh., Mtn. Turkm., Pam.-Al., T. Sh. **Gen. distr.:** Med. (W. and E.), Bal.-As. Min., Arm., Kurd., Iran. Described from Syria. Type in London.

**Note.** This species needs a critical study and field observations. Having such a vast distribution area, it is certainly not morphologically homogeneous; it is difficult, however, to correlate morphological differences with geographical location on the strength of herbarium material. Further studies would most likely lead to differentiation of minor geographical races differing in the combination of inconspicuous and often quantitatively assessable characters, such as variations in the degree of glandularity, length of the point of calyx-teeth, size and coloring of flowers, etc.

It should be pointed out that *S. sclarea* has a higher content of essential oil than other sage species and has long been in cultivation for oil extraction. It has been

repeatedly noted by botanists that there are considerable differences in the oil yield of plants from different geographic locations. Thus, Kudryashev reports that violet-flowered plants from the middle reaches of the River Talas produced a very high yield (0.29%), while white-flowered plants from the central part of Gissar Range gave a much lower yield (0.2%) even though they had been harvested at the same development stage. A study of morphological characters has disclosed that, beside the difference in flower color, the plants from the River Talas were more profusely glandular and had more pointed calyx-teeth than the Gissar plants. However, these features were not consistently apparent in all the specimens examined. A xerophytic form growing along the southern coast of Crimea is notable for the smaller size of its parts; its stem and leaves have a more copious, often floccose, indument, and its relatively small floral leaves are often reclinate; it often occurs side by side with the typical form. The economic value of these forms has not been explored. Compact natural stands of *S. sclarea* have not been found anywhere; the plant must therefore be cultivated, but it flourishes even without irrigation.

**Economic importance.** Clary sage is rich in essential oil which contains linalyl acetate, linalyl formate, linalool, formic and acetic acid (Vil'yams in Tr. prikl. bot. 25, 1930, 411—413). A more delicately scented essence, containing linalyl acetate, linalool, cedrene, sclariol and sesquiterpene, has been obtained by extraction. The most productive output is secured by distillation of inflorescences at the stage of flowering and incipient fruiting. The oil is widely used in the perfume industry, for production of scents, Eau de Cologne, etc. In Germany, it has long been used for wine flavoring.

313 Central Asian plants give a higher yield of essential oil (0.3%). Clary sage is cultivated commercially in Crimea, Kuban', Central Asia, Ukraine and Moldavian SSR. Two high-yielding varieties produced at the Crimean Station for Essential Oil Crops, S-24 and S-28, yield 0.33% and 0.3%, respectively (Sinyagin, Muskatnyi shalfei kak maslichnoe syr'e [Clary sage as a source of oil], 1932). The first-mentioned was bred from wild-growing Crimean sage.

The highest concentration of essential oil is in inflorescences. The seeds contain a valuable drying oil which is used in the production of varnishes and paints. Experiments directed toward double-purpose utilization of clary sage, i.e., oil extraction after threshing, have shown that the chaff obtained after winnowing of ripe seeds gives only half the amount of essential oil compared with the output from flowering plants. It has been found that, additionally to the seed crop, one hectare can yield 1.5 kg essential oil. Considering the chemical composition, oil cake produced from this plant could be of value for feeding purposes. The agrotechnics of clary sage is described by Gun'ko (Muskatnyi shalfei, 1929).

Series 2. *Kopetdagenses* Pobed. — Leaves evenly distributed along the stem, entire; floral leaves green or scarious, shorter than calyx, rarely as long; flowers 1.5—3 cm long, white or yellow; inflorescence simple or with 1 pair of branches not reaching the summit of axis.

39. *S. kopetdaghensis* Kudr. Mat. k izuch. shalf. Sr. Az. (1937) 26.

Biennial or perennial, 50–60 cm high; root vertical, woody, the root collar tomentose; stem erect, simple, stout, as long as or longer than inflorescence, with sulcate faces, covered with long fine multicellular implexed hairs and short-stipitate glands, in inflorescence with long-stipitate glands, these intermixed with short thickish hairs and long distally attenuate hairs; radical and lower cauline leaves broad-ovate, ovate or rhomboid-oblong, elliptical or lanceolate, 8 (11) 13 cm long, 3 (5.5) 8 cm broad, subcordate, acute, not rugose or slightly rugose at margins and at apex, erose-dentate, sometimes sublobate, hairy on both sides, the hairs long, distally strongly attenuate, implexed, lined with short-stipitate and bright orange sessile glands, the petioles with similar vesture, as long as or slightly shorter than blade; cauline leaves small, lanceo-  
314 late, sessile; leaves subtending inflorescence branches amplexicaul, gradually long-attenuate and terminating in a very short spinule; floral leaves broad-ovate, 12–15 mm long, about equaling the calyx, acuminate, often spinescent-aristate, entire, green or violet-tinged, with indument as on other leaves but more copious; inflorescence paniculate, with thick divaricate branches; verticillasters 6–8, 2.5–3 cm apart, the terminal usually barren, the others 4–6-flowered; calyx campanulate, 12–14 mm long, 15-nerved, covered, especially on nerves and at margin with long-stipitate glands; upper lip rounded, with distally connivent teeth, the middle tooth very small, scarcely subulate-pointed, the lateral teeth upright; lower lip with 2 long lanceolate teeth, these subulate-pointed like those of upper lip; fruiting calyx infundibular, dilated; corolla white, 2.5–3 cm long, the tube exerted, abruptly dilated, the scale at throat oblong, 1.5 mm long, 1 mm broad, glandular-hairy at margin; upper lip of corolla falcate, broad, with violet multicellular hairs on the back, especially toward apex; lateral lobes of lower lip oblong, broad, acute, middle lobe broadly obovate, laterally expanded, deeply concave, hairy-margined; stamens and style prominently exerted; sterile anther-locules with upper and lower notch and a triangular process at the middle; lobes of stigma unequal; nutlets unknown. May–June.

Mountain slopes, in steppes of the middle and upper mountain zones. — Centr. Asia: Mtn. Turkm. Endemic. Described from Ashkhabad area. Type in Leningrad.

Note. This species scarcely differs from the preceding, even though attempts were made by the author to indicate differences based on field observations.

40. *S. linczevskii* Kudr. in Mat. k izuch. shalf. Sr. Az. (1937) 22. — Ic.: op. cit., Fig. 2.

Perennial, 50–80 cm high; stem erect, simple, covered in inflorescence with long fine implexed hairs on the ribs and short whitish glands mainly on the faces, tomentose at nodes, with indument progressively sparser toward summit, in inflorescence with fine implexed hairs intermixed with scattered thickened hairs and short- and long-stipitate glands; leaves evenly distributed along the stem; radical and lower cauline leaves oblong-lanceolate or elliptical, 7 (10) 15 cm long, (2.5) 5 (6) cm broad, acute, subcordate or rounded at base, erose-dentate, more strongly so at base, rugose (especially at margin), sometimes smooth, covered on both sides with implexed hairs,  
315 these lined, especially beneath, with short-stipitate and scattered sessile glands; petioles as long as blade, strongly dilated at base, amplexicaul, tomentose; upper cauline



leaves much smaller, strongly rugose, short-petioled or sessile; lower floral leaves ovate, sessile, acute, with similar indument but more heavily white-tomentose at apex; upper floral leaves small, broad-ovate, much shorter than calyx, long-pointed, sessile, clasping, green, tomentose and covered with long- and short-stipitate as well as sessile glands; inflorescence with long strict upright branches; verticillasters 3–6 cm apart, 6-flowered, the terminal usually sterile; pedicels 3–4 mm long, patent-hairy; calyx campanulate, covered outside with thickened multicellular hairs intermixed with long- and short-stipitate as well as sessile glands, sparsely pubescent on the teeth inside, glabrous in the tube, the upper lip rounded, with short convergent teeth, the middle tooth indistinct, shorter than the lateral, the lower lip with 2 longer teeth, all teeth subulately short-pointed; corolla white, 2–2.5 cm long, the tube included, abruptly dilated, the scale semiorbicular, 0.5 mm long, 1.25 mm broad, glandular-hairy at upper margin; upper lip of corolla falcate, slightly longer than the lower, hairy at apex, the multicellular lustrous hairs blue, in herbarium violet; lateral lobes of lower lip oblong, broad, strict, middle lobe broadly obovate, laterally extended, deeply concave, not emarginate, with slightly and unevenly toothed margin; stamens and style prominently exserted; sterile anther-locules deeply notched at the middle; lobes of stigma somewhat unequal; nutlets subglobose, gently trigonous, 3 mm long, pale greenish-brown with dark-brown reticulation. Fl. and fr. June.

Fescue-needlegrass steppes of the upper mountain zone. — Centr. Asia: Mtn. Turk. Endemic. Described from the Chandyr-Sumbar water divide. Type in Leningrad.

41. *S. grossheimii* Sosn. in Tr. Az. FAN SSSR, I (1933) 45; Grossg. Oprod. rast. Kavk. 342.

Perennial; rhizome woody; stems several or solitary, erect, simple, covered with short or long fine appressed implexed hairs, in inflorescence more densely covered with fine spreading implexed multicellular hairs and short-stipitate glands; leaves rather evenly distributed along the stem, oblong, 5.5–9 cm long, 1.5–3 cm broad, subobtusely rounded or cuneate at base, sometimes with several pairs of lobes, more or less erose-dentate, rugose, finely arachnoid-pubescent on both sides, more heavily beneath and here with numerous sessile golden-colored glands; upper cauline leaves smaller, sessile; floral leaves suborbicular, sessile, scarious, short-acuminate, with a firm point, densely arachnoid-pubescent beneath and with long-stipitate and sessile golden-colored glands, equaling or exceeding the calyx; inflorescence simple or with 1–2 pairs of strict branches; verticillasters 4–8-flowered, 1–2 cm apart; pedicels puberulent; calyx campanulate, 8–10 mm long, densely covered with long eglandular and glandular taeniate hairs as well as large sessile glands; middle tooth of upper calyx-lip obsolescent, lateral teeth short, erect, triangular; lower lip with 2 large lanceolate teeth; all teeth subulately long-pointed; corolla-tube included, abruptly dilated, the scale 1–1.5 mm long, 1 mm broad, glandular-ciliate; corolla yellow, 1.5–2 cm long; upper lip of corolla longer than the lower, falcate, truncate at apex and emarginate, covered on the back with short-stipitate glands and close-jointed taeniate hairs; lateral lobes of lower lip broadly oblong, scarious; middle lobe laterally extended, obovate, cup-shaped, not emarginate; sterile anther-locules rectangular, scarious; style prominently exserted, puberulent; lobes of stigma very unequal, annular; nutlets unknown. June.

Stony and grassy northern mountain slopes. — Caucasus: S. Transc. (Nakhichevan). Endemic. Described from Darridag Mountains. Type in Tbilisi.

42. *S. hajastana* Pobed. sp. n. in Addenda XX, 658. — *Salvia grossheimii* auct. fl. Cauc.

Perennial, 30–35 cm high; rhizome woody, dark brown; stems solitary, erect, simple, briefly appressed-pubescent all along, without glandular hairs in inflorescence; leaves evenly distributed along the stem, oblong, 6–10 cm long, 2.5–3 cm broad, obtuse, cuneate or rounded at base, subentire or unevenly and bluntly erose-dentate, rugose, with short fascicled hairs between the veins above, thinly arachnoid beneath, with a large number of sessile orange glands, the lower with petiole the length of blade, the middle smaller, 317 short-petioled, the upper sessile; lower floral leaves lance-ovate, sessile, amplexicaul, green, rugose; upper floral leaves suborbicular, sessile, amplexicaul, long-attenuate at apex, with a very short fine point, glabrous above, arachnoid beneath, slightly shorter than calyx; inflorescence simple or with 1 pair of branches, these not reaching the summit of axis; verticillasters 1–1.5 cm apart, the lower 3 cm apart, 4–6-flowered; pedicels 2–3 mm long, short-pubescent; calyx campanulate, 8–10 mm long, densely covered with short fine crisp hairs; upper lip about as long as the lower, rounded, with 3 approximate teeth, the middle tooth obsolescent, the lateral narrow, subulate, connivent, the lower lip with 2 longer fine-pointed teeth; corolla 2.5–3 cm long, the tube slightly exserted, abruptly dilated, the scarious scale 1.5 mm long and 1.25 mm broad, obtuse, glandular-ciliate at upper margin; upper lip of corolla much longer than the lower, broad, falcate, truncate and emarginate at apex, sparsely covered with multicellular violet hairs; lateral lobes of lower lip elliptical, broad, obtuse; middle lobe broadly obovate, wider than long, somewhat concave; sterile anther-locules flat, evenly rectangular, scarious; stamens and style exserted; lobes of stigma unequal; nutlets unknown. May.

Grassy slopes. — Caucasus: S. Transc. (Nakhichevan ASSR). Endemic. Described from Bichenakh. Type in Leningrad.

43. *S. karabachensis* Pobed. sp. n. in Addenda XX, 659.

Perennial, 40–60 cm high; stem erect, simple, covered from base with long fine implexed hairs and very short hairs or only with very short hairs, in inflorescence with more copious hairs intermixed with long-stipitate glands; leaves evenly distributed along the stem, oblong-ovate, (9) 11 (14) cm long, (5) 6 (7) cm broad, obtuse, rounded at base, coarsely and unevenly erose-dentate, smooth or scarcely rugose at margin, subglabrous above or with scattered fascicles of fine multicellular hairs between the veins, sparingly covered on the veins beneath with long fine hairs; lower and middle cauline leaves on petiole 2–3 cm long, the upper smaller, sessile; leaves subtending inflorescence lanceolate, long-acuminate, sessile, green, arachnoid on both sides; floral leaves membranous, green-margined, entire, tapering to a long point, sessile, amplexicaul, reclinate at anthesis, shorter than calyx, the lower broadly lanceolate, the upper rounded; inflorescence simple 318 or with 1 pair of divaricate branches at base, these not reaching the summit of axis; verticillasters 4–9, spaced 2–5 cm apart, 4–6-flowered; pedicels 3–4 mm long, short-pubescent; calyx 10–12 mm long, broadly campanulate, densely covered outside with simple

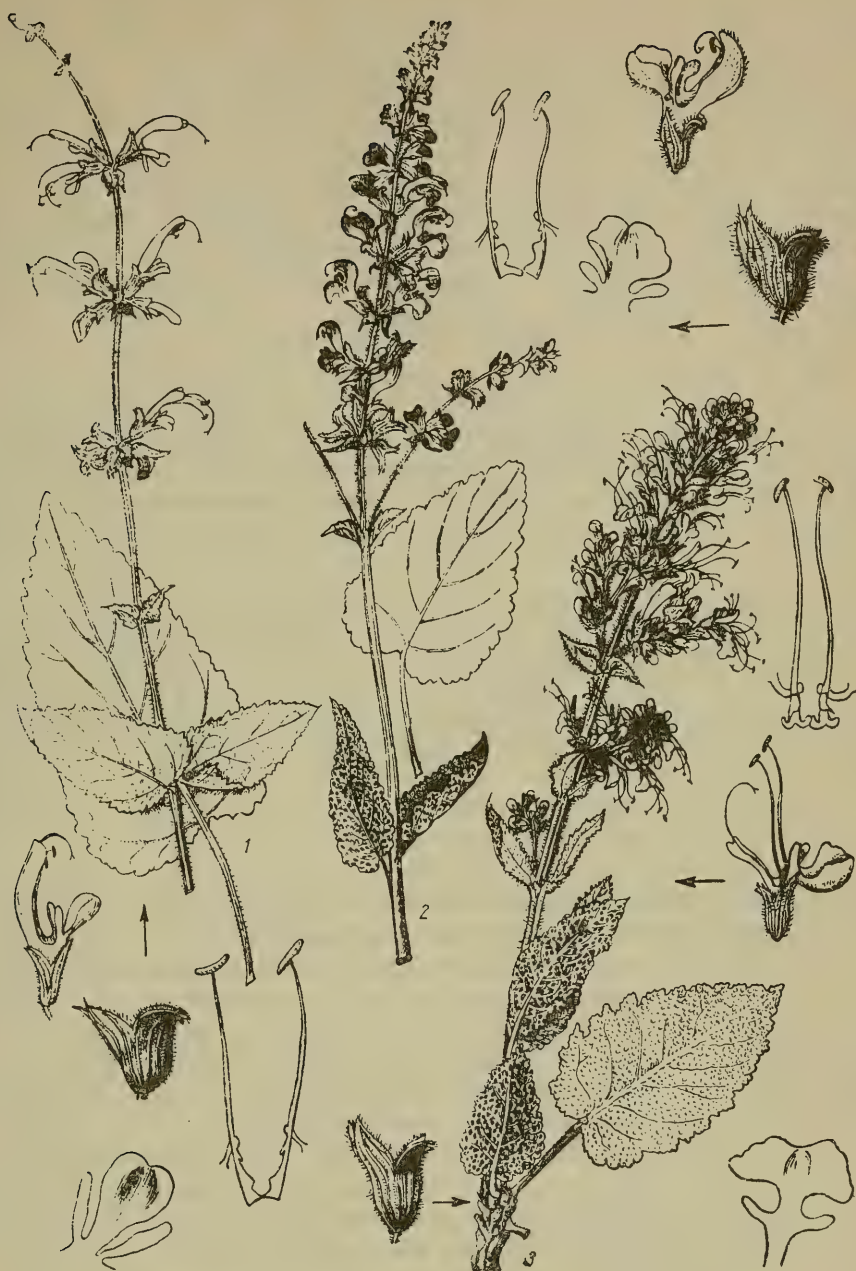


PLATE XVI. 1 – *Salvia kusnetzovii* Sosn.; 2 – *S. stepposa* Schost.; 3 – *S. armeniaca* (Bordz.) Grossh. General aspect and details: flowers, fruiting calyx, stamen, lower lip of corolla.



multicellular hairs and long-stipitate glands, inside with very short glandular hairs, the upper lip rounded, with 3 widely separated erect teeth, the middle one-fourth to one-third the length of the lateral, the lower lip bidentate nearly to the middle, with ovate teeth; all teeth terminating in a long slender subulate point; corolla 2–3 cm long, the tube rather long, abruptly dilated, the scarious scale 0.75 mm long, 1.5 mm broad, glandular-hairy at upper margin; upper lip of corolla broad, falcate, emarginate, covered on the back (more copiously at apex) with violet lustrous multicellular hairs; lateral lobes of lower lip oblong, acute, strict; middle lobe broadly obovate, laterally extended, slightly concave; stamens and style prominently exserted; sterile anther-locules rectangular, scarious, surmounted by a single process; nutlets unknown. May.

On slopes, in thin arid woods. — Caucasus: S. Transc. (Karabakh). Endemic. Described from Pirchevan village. Type in Leningrad.

Series 3. *Lanatae* Pobed. — Nearly all leaves in radical rosette; floral leaves as long as or shorter than calyx; flowers 10–22 mm long, white or violet; upper stamens staminodial; inflorescence a pyramidal many-flowered panicle, rarely with 2–3 pairs of branches; indument of calyx and of plant as a whole white-floccose-tomentose.

44. *S. aethiopsis* L. Sp. pl. (1753) 39; M. B. Fl. taur.-cauc. 1, 23; Benth. Lab. Gen. et sp. 226 et in DC. Prodr. XII, 283; Ldb. Fl. Ross. 361; Boiss. Fl. or. IV, 616; Shmal'g. Fl. II, 318; Grossg. Fl. Kavk. III, 321; Kudr. Mat. k izuch. shalf. Sr. Az. 16. — *Sclarea aethiopsis* Mill. Gard. Dict. (1768) No. 2. — *S. lanata* Moench, Meth. pl. (1794) 374. — Ic.: Rchb. Ic. fl. Germ. XVIII, tab. 1248. — Exs.: Fl. Gall. et Germ. No. 912; Fl. exs. Reip. Noh.-Slov. No. 60.

321 Perennial, 50–100 cm high or higher, white-eriphorous or arachnoid all over; stem erect, simple, half the length to length of inflorescence; leaves nearly all radical, ovate, oblong or elliptical, (7) 10 (23) cm long, (4) 7.5 (14) cm broad, acute to obtuse, cordate, crenate-dentate, sometimes lobate and incised halfway to midvein, white-tomentose beneath, with sparser indument and darker above, whitish beneath, the petiole as long as or shorter than blade; cauline leaves sessile, oblong-ovate, sharply or bluntly toothed; lower floral leaves broad-ovate, gradually long-attenuate at apex, reclinate, amplexicaul; upper floral leaves suborbicular or broader than long, abruptly short-pointed, with a firm subulate point, long-lanate outside or with scattered short appressed hairs and only at margin with long fine crisp hairs, as long as or barely shorter than calyx; inflorescence a pyramidal panicle, large, many-branched, the branches with 4–6 approximate 6–10-flowered verticillasters; calyx white-lanate to the middle outside and inside, rarely covered with short thick-based hairs, prominently ribbed in fruit; middle tooth of upper lip slightly shorter than the lateral teeth, lower lip with 2 longer teeth; all teeth subulate-pointed, the points pubescent; corolla white, 12–22 mm long, slightly exserted, the tube included abruptly dilated, the scale at the abrupt dilation of tube half-rounded, broader than long, long-fimbriate; upper lip of corolla about as long as or slightly longer than the elongated lower lip, subfalcate or nearly straight, covered on the back with fine soft white hairs and sessile glands; lower

lip divergent, strongly elongate, the middle lobe broad, emarginate, angular, the lateral lobes strict, oblong, twisted, pubescent inside, densely covered outside with sessile glands; stamens concealed under upper lip, sterile anther-locules, elongate at the inner upper angle and fastened by the lower processes, surmounted by a linear acute appendage; upper stamens reduced to minute small-headed staminodes; style slightly exserted; lobes of stigma unequal; nutlets 2–2.5 mm long, trigonous-ellipsoid, greenish-brown with darker reticulation. May–August.

Steppes, meadows on mountain slopes, dry stony and clayey places, chalk and limestone outcrops, plowed fields and pastures. — European part: M. Dnp., Bes., Bl., Crim.; Caucasus: throughout; Centr. Asia: Syr D., Pam.-Al., Mtn. Turk. Gen. distr.: Centr. and Atl. Eur., W. and E. Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from Illyria. Type in London.

Note. The species varies widely in its indument: leaves, stems, floral leaves and 322 calyx range from completely white-lanate to completely glabrous or subarachnoid, the hairs long, fine, scarcely implexed; floral leaves and calyx with short hairs largely confined to nerves. Sparser indument of plants occurring in the Main Caucasus Range is usually associated with oblong, white-pubescent, deeply lobed leaves. In other places, e.g., in the Balkan Peninsula and in Kopetdag, such a combination of characters has not been encountered. The sparsely hairy form is scattered throughout the distribution area, in some places more frequently than in the Main Range; in other areas, such as Transcaucasia, it occurs more rarely, the white-pubescent forms being more prevalent. The size of floral leaves is variable; they are mostly as long as calyx, more rarely about half the length. It has not been possible to establish any geographic correlation for this character. Flower length ranges from 12 to 22 mm.

**Economic importance.** This species yielded toward the end of flowering 0.056% essential oil (Vyshenskii in Symp. "Zemledeľ'ch. Turkmeniya," 1935).

Series 4. *Verbascifoliae* Pobed. — Leaves nearly all radical or 1–2 pairs cauline, entire; floral leaves green, shorter than calyx; flowers 1.5–3 cm long, whitish-yellow; inflorescence with 2–4 pairs of branches or simple.

45. *S. verbascifolia* M. B. Fl. taur.-cauc. III (1819) 24; Benth. Lab. Gen. et sp. 227; Ldb. Fl. Ross. III, 362, p. p.; DC. Prodr. XII, 285; Boiss. Fl. or. IV, 619; Grossg. Fl. Kavk. III, 322. — *S. candidissima* M. B. Fl. taur.-cauc. I (1808) 22, non Vahl. — *S. verbascifolia* var. *cana* Boiss. l. c. 619. — *S. argentea* L. var. *floccosa* O. Ktze. in Tr. Bot. sada X (1887) 229.

Perennial, (15) 25 (35) cm high; stems several, simple, erect, covered with short crisp hairs intermixed with spreading taeniate multicellular hairs, in inflorescence also with long-stipitate glands; leaves broad-ovate, cordate, obtuse or almost rounded at apex, mostly radical, (3.5) 4.5 (12) cm long, (3) 5 (10.5) cm broad, rugose, tomentose, with white tomentum beneath, doubly dentate, more or less deeply erose, the petiole

2.5–6 cm long, tomentose; cauline leaves usually 2 pairs, resembling the radical but smaller; leaves subtending inflorescence lanceolate, narrow, acute, sessile; floral leaves green, broad-ovate, long-attenuate to a subulate point, tomentose beneath, with long-stipitate glandular hairs at margin, minutely puberulent above, shorter than calyx; inflorescence with 2–4 pairs of strict branches or simple; verticillasters 1–2.5 cm apart or closer, 2–6-flowered, the terminal sterile; calyx campanulate, prominently ribbed, 10–12 mm long, covered with long taeniate hairs intermixed with long- and short-stipitate as well as scattered golden-colored sessile glands; upper calyx-lip with 3 short teeth, the middle minute, the lateral apically convergent; lower lip with 2 longer teeth; all teeth subulate; corolla 2–2.5 cm long; upper lip white, broadly falcate, with sessile glands; lower lip yellowish, the lateral lobes oblong, strict, the middle lobe broadly obovate, laterally extended, not emarginate; corolla-tube short, abruptly dilated, the scale half-rounded, scarious, 1.25 mm long, 0.75 mm broad, glandular-hairy at upper margin; stamens exserted; sterile anther-locules flat, scarious, rectangular, deeply notched in upper third, surmounted by linear acute processes of connective; style exserted 4 mm; lobes of stigma filiform, unequal (one half as long as the other); nutlets 3 mm long, subglobose, pale yellow with darker reticulation. April–July.

Stony slopes, on rocks. — Caucasus: Dag., E. and S. Transc. **Gen. distr.:** Arm.-Kurd. Described from River Samur in Azerbaidzhan. Type in Leningrad.

Note. *S. verbascifolia* is almost endemic for the Caucasus, penetrating only into adjoining areas (Kagyzman). We have not found a single specimen identical with the Caucasian plant either from Asia Minor or from the Balkan Peninsula, although some of them had been determined as varieties of *S. verbascifolia*.

46. *S. andreji* Pobed. sp. n. in Addenda XX, 659.

Perennial, 30–50 cm high; stems 1 or 2, erect, simple, with 5–6 pairs of leaves, longer than inflorescence, densely covered from base and in inflorescence with long taeniate implexed hairs (the flat broad segments disposed in different planes); radical leaves few, broadly elliptical 7–9.5 cm long, 3.5–4.5 cm broad, obtuse or rounded at apex and at base, doubly erose-dentate or sublobate, glabrous above with few flat-jointed hairs confined to midrib, sparsely covered beneath (mainly on the veins) with scattered long taeniate hairs intermixed with short thickish 3-jointed hairs, the petiole one-third the length of blade, channeled on the inside, densely covered outside with multicellular implexed hairs; middle and upper cauline leaves ovate, slightly cordate, sublobate, with even shorter petiole or sessile; upper cauline leaves amplexicaul, lanceolate; lower floral leaves broadly lanceolate, long-acuminate, amplexicaul, large-lobed, densely covered beneath with multicellular implexed hairs, with scattered hairs above; upper floral leaves suborbicular, abruptly pointed, half the length of calyx, reflexed at anthesis, with long taeniate hairs beneath and at margin, glabrous or sparsely puberulent above, the uppermost violet-tinged especially at margin; inflorescence simple or with 1 pair of strict branches not reaching the summit of inflorescence axis; verticillasters 17–19, spaced 1–1.5 cm apart, 4–6-flowered; pedicels densely white-pubescent, 1.5–2 mm long; calyx 8–10 mm long, cleft to the middle, densely covered with long taeniate hairs and sometimes with few long-stipitate glands, the upper lip rounded, with 3 short subequal convergent teeth, the lower lip with 2 longer lanceolate



teeth, all teeth subulate-pointed; corolla 15–17 mm long, violet, the tube slightly exserted, glabrous inside; upper lip about as long as or slightly longer than the lower, falcate, densely covered outside with short white hairs and golden-colored sessile glands; middle lobe of lower lip deeply concave; lateral lobes broadly elliptical, obtuse; posterior arm of staminal connective long; fertile anther-locules under the hood of upper lip; sterile locules very slightly notched; style exserted, violet, with scattered short pubescence; lobes of stigma unequal; nutlets unknown. July.

Basalt rocks in mid-mountain zone. — Caucasus: S. Transc. Endemic. Described from Nakhichevan ASSR. Type in Leningrad.

47. *S. xanthocheila* Boiss. ex Benth. in DC Prodr. XII (1848) 284; Boiss. in Kotschy, Pl. exs. Pers. bor. (1846) nom. nudum; Boiss. Diagn. ser. 1, 12, 59; Bge. Lab. pers. 46; Boiss. Fl. or. IV, 620; Grossg. Fl. Kavk. III, 322. — *S. frigida* Boiss. in Nouv. Mem. Soc. Nat. Mosc. XII, 173, non Boiss. in Diagn. — Exs.: Kotschy, l. c. No. 128.

Perennial, (9) 12 (30) cm high; stem erect, simple, as long as or shorter than inflorescence, covered from lower internodes with long- and short-stipitate glands intermixed with short and long multicellular eglandular hairs, more copiously glandular-hairy on upper internodes and in inflorescence; leaves nearly all radical, broad-ovate to suborbicular, (3) 6.5 (10) cm long, (2.5) 5 (7) cm broad, subcordate, obtuse; leaves mostly radical, broad-ovate to suborbicular, (3) 6.5 (10) cm long, (2.5) 5 (7) cm broad, subcordate, obtuse, not rugose, white-tomentose on both sides (more densely beneath), doubly dentate, erose or sublobate, on petiole 2–6 cm long; cauline leaves shorter and narrower, usually 1 sessile pair, rarely 2 pairs and then the lower petiolate; lower floral leaves smaller again, sessile; floral leaves rounded-ovate, entire, almost scarious, sessile, short-acuminate, longer than calyx, tomentose and glandular-pubescent; inflorescence simple or with 1–2 pairs of short branches; verticillasters 1–2 cm apart, 6–8-flowered; pedicels 2–3 mm long; calyx broadly campanulate, 14-ribbed, covered with long-stipitate glands intermixed with long fine and short thickened hairs; upper calyx-lip with a minute middle tooth and erect lateral teeth, lower lip with 2 longer lanceolate teeth, all teeth subulately short-acuminate; corolla 2–2.5 cm long, the scale in corolla-tube linear, 1 mm long, 0.25 mm broad, glandular-hairy at upper margin; upper lip of corolla sulfureous, slightly falcate, narrow, covered with sessile rounded glands and sometimes at apex with multicellular lustrous lilac hairs; lower lip white, shorter than the upper, narrowing at base, the lateral lobes oblong, the middle lobe broadly obovate, laterally extended, deeply concave, with unequally and obtusely toothed margin; sterile anther-locules slightly notched, surmounted by a narrow linear process of staminal connective; style long, exserted; lobes of stigma unequal; nutlets 2.5 cm long, rounded-trigonus, pale yellow with darker reticulation. May–July.

Dry stony slopes and rocks. — Caucasus: S. Transc., Tal. Gen. distr.: Arm.-Kurd., Iran. Described from N. W. Iran (from Mt. Elburs). Type in Geneva.

Series 5. *Limbatae* Pobed. — Leaves evenly distributed along the stem or gathered in its lower part, entire; floral leaves with green or whitish hairs, shorter than calyx; flowers

1.6–2.5 cm long, white or pink, the middle lobe of lower lip yellowish; inflorescence paniculate; upper stamens staminodial.

48. *S. limbata* C. A. M. Verzeichn. (1831) 86; Benth. Lab. Gen. et sp. 718; Hohen. Enum. Talüsch. 64; Ldb. Fl. Ross. III, 360; Benth. in DC. Prodr. XII, 279; Boiss. Fl. or. IV, 623; Grossg. Fl. Kavk. III, 321. — *S. limbata* C. A. M. var. *aspera* Fom. ex Grossh. Fl. Kavk. III (1932) 321. — Exs.: Herb. Fl. Cauc. No. 237.

- 326 Perennial, 30–60 cm high; stem erect, simple, subglabrous or with scattered thick papilliform hairs, more densely hairy in inflorescence, the upper internodes also with long-stipitate glands; radical leaves broad-ovate or elliptical, (5) 7 (11) cm long, (3.5) 5 (7.5) cm broad, cordate, obtuse, erose-dentate, sometimes sublobate, rugose, green, sparsely pubescent above, with fascicles of multicellular hairs between the wrinkles, with isolated hairs or subglabrous, densely covered on the veins beneath with short 2–3-jointed sharp-pointed strict hairs and golden-colored sessile glands, the midrib covered on both sides (more densely beneath) with scattered thick-based multicellular hairs, the petiole about as long as the blade, with scattered long taeniate hairs above a dense lining of short hairs; cauline leaves small, short-petioled or sessile; all floral leaves small, broadly ovate-lanceolate, long-acuminate and terminating in a firm spine, sessile, amplexicaul, entire, ciliate, shorter than calyx, subglabrous above, covered beneath with short appressed hairs, soon deciduous; inflorescence long, paniculate, divaricately branched from base; verticillasters 5–11, spaced 2–2.5 cm, the lower 5 cm apart, 2–6-flowered, the uppermost two usually sterile; calyx 6–8 mm long, campanulate, slightly accrescent, prominently ribbed, covered with thick-based multicellular hairs on the ribs and with copious short-stipitate glands between them, covered all over with sessile glands and very numerous taeniate hairs (var. *aspera* Fom.); corolla white or pink, with shiny brown-margined lower lip, three times the length of calyx; corolla-tube short, the nectary-scale 1.5 mm long and 1 mm broad, with glandular hairs at upper margin; upper lip of corolla longer than the lower, falcate, covered outside on the back with multicellular and short thickened hairs, bearded at apex; lateral lobes of lower lip elliptical-oblong, strict; middle lobe broadly obovate, deeply concave, emarginate, covered beneath with multicellular hairs and sessile glands; filaments pubescent; sterile anther-locules scarious, rectangular, slightly notched, not appendaged, connected at base; staminodes short, large-headed; style pubescent, long-exserted; lobes of stigma very unequal; nutlets ellipsoid, 3 mm long, light-brown or golden-brown with darker reticulation. May–July.

- 327 Dry stony slopes in the middle mountain zones. — Caucasus: S. Transc., Tal. Gen. distr.: Arm.-Kurd. (Kars). Described from Talysh. Type in Leningrad.

Note. It may be noted that the Erevan specimens of this species differ somewhat from Talysh plants; they are less vigorous, their flowers are smaller, the upper lip of corolla is nearly straight (not falcately curved), the indument of leaves almost devoid of short simple hairs that are very characteristic of Talysh specimens. Nakhichevan specimens approach more closely those from Erevan, but their calyx, floral leaves and the tip of upper corolla-lip are more densely covered with taeniate hairs. They were separated in the herbarium by N. Popov as f. *aspera*. We are not, however, inclined to ascribe any major systematic significance to these forms, since specimens with similar

flowers also occur in Talysh. Moreover, segregation of the Erevan and Nakhichevan forms and distinct races would give *S. limbata* a very unnatural distribution area (Talysh, Tbilisi area, Kagyzman), quite apart from the already mentioned fact that individual specimens indistinguishable from the Talysh plants are also to be found in Nakhichevan.

**Economic importance.** The plant contains a pine-scented essential oil distinguished by a characteristic aroma (Gurvich and Gadzhiev in Tr. Bot. inst. Az. FAN SSSR, III, 1938).

49. *S. chloroleuca* Rech. f. et Aellen in Oesterr. Bot. Zeitschr. XCIX, 1 (1952) 59. — *S. limbata* auct. fl. As. Med. non C. A. M. — Ic.: Rech. f. l. c. 63. Abb. 9a–c.

Perennial, 40–60 cm high; stem erect, simple, covered on the ribs with short thick hairs, between them with numerous short-stipitate glands, the ribs in inflorescence with long fine-pointed hairs and long-stipitate glands; leaves more or less evenly distributed over the lower part of stem, oblong-ovate, 8–14 cm long, 5–7 cm broad, subcordate, erose-dentate, sublobate toward base, smooth or slightly rugose, green, glabrous or with few scattered hairs above, densely covered on the veins beneath with short spreading hairs, between the veins with numerous golden-colored sessile glands, the midrib with scattered few-celled papilliform hairs only beneath, the petiole to 6 cm long, with scattered long thick-based and numerous short hairs, often with few sessile glands; lower cauline leaves short-petioled; upper cauline smaller, sessile; floral leaves small, 328 broad-ovate, sharply long-acuminate, entire, ciliate, sessile, persistent, half the length of calyx, densely covered on both sides with hairs as on other leaves and a lining of numerous short-stipitate glands; inflorescence long, paniculate, divaricately branched from base; verticillasters 5 or 6, spaced 2–3 cm apart, 3–6-flowered; calyx 12–15 mm long, campanulate, slightly accrescent, prominently ribbed, covered with scattered papilliform hairs on the ribs, with short- and long-stipitate glands between them, the upper lip shorter than the lower, recurved in fruit, concave, with a very short middle tooth and erect lateral teeth, the lower lip with 2 long lanceolate teeth, all teeth subulately long-pointed; corolla white, turning brown in drying, twice the length of calyx; corolla-tube short, the nectary-scale broad, half-rounded, 1 mm long, 1.5 mm broad, glandular-hairy at margin; upper lip of corolla twice as long as the lower, falcate, with few multicellular thick-based hairs outside, not bearded at apex; lateral lobes of lower lip oblong, strict; middle lobe suborbicular, emarginate, concave, similarly hairy and covered with sessile glands; stamens as in the preceding species; nutlets ellipsoid, subglobose-trigonus, 3.5 mm long, light brown with darker reticulation. May–June. (Plate XV, Figure 1.)

Juniper groves on mountain slopes. — Centr. Asia: Mtn. Turkm. (Kopet Dag).

**Gen. distr.:** Iran. Described from Kuchan. Type in Vienna.

50. *S. prilipkoana* Grossh. et Sosn. in Izv. Az. FAN SSSR, 10 (1944) 10; Grossg. Oprod. rast. Kavk. 342.

Perennial, 20–40 cm high; stem erect, sparingly branched, slender, minutely puberulent, in upper part also with scattered thick-based hairs, in inflorescence more densely pubescent and with taeniate hairs; leaves evenly distributed along the stem,



oblong-ovate or oblong, 2–4 cm long, 1.2–2 cm broad, rounded or cuneate at base, acute, crenulate, rugose, green subglabrous above, whitish or grayish beneath with numerous fine crisp hairs, lower cauline leaves with petiole longer than blade; upper leaves much smaller, sessile; floral leaves small, as long as or shorter than calyx, orbicular or ovate, short-pointed, densely covered beneath with white crisp implexed hairs; inflorescence paniculate, few-flowered; verticillasters 7, spaced 1.5–2.5 cm apart, 2–4-flowered; calyx 6–8 mm long, campanulate, slightly accrescent, very densely white-pubescent with soft spreading crisp multicellular hairs; upper calyx-lip equaling the lower, with 3 very short subequal teeth, lower lip with 2 longer broad-lanceolate short-pointed teeth; corolla white; corolla-tube short, the nectary-scale 1 mm long, 0.75 mm broad, glandular-hairy at upper margin; upper lip of corolla strongly falcate, broad, more or less covered on the back with soft white hairs and sessile yellow glands; lower lip about equaling the upper, the middle lobe yellowish, broadly obovate, wider than long, deeply concave, the lateral lobes ovate, obtuse, undulate-margined; stamens slightly exerted; sterile anther-locules deeply notched, surmounted by lanceolate acute appendages; staminodes very short, large-headed; style pubescent, greatly exceeding the upper corolla-lip; lobes of stigma unequal; nutlets ovoid, 2.5 mm long, smooth. May.

Stony slopes. — Caucasus: S. Transc. (Nakhichevan ASSR). Endemic. Described from Dyrnys village. Type in Baku.

51. *S. fominii* Grossh. in Izv. Az. FAN SSSR 10 (1944) 39. — *S. limbata* C. A. M. var. *foliosa* Bordz. in Izv. Kievsk. bot. sada, V–VI (1927) 20.

Perennial, 40–60 cm high; stems branched, subglabrous or more or less covered with rough crisp hairs, leafy from base to summit; leaves strongly rugose, the lower oblong or oblong-oval, 6–10 cm long, 2.5–4.5 cm broad, rounded or subcordate at base, unevenly crenate-dentate, subglabrous above, densely covered beneath with sessile yellow glands; upper cauline leaves progressively decreasing in size; inflorescence paniculate, many-flowered; verticillasters 2–6-flowered; floral leaves herbaceous, ovate, shorter than calyx, soon deciduous; calyx 7 mm long at anthesis, campanulate, prominently nerved, more or less hispid, especially on nerves; lips widely spreading, the upper with short upcurved sharp-pointed teeth, the lower with 2 longer broad-lanceolate pointed teeth; fruiting calyx enlarged, 10 (11) mm long including teeth, ca. 5 mm broad; corolla (14) 16–18 (19) mm long, white; upper lip strongly curved, bristly-hairy at apex; middle lobe of lower lip rounded, yellowish; seeds ovoid, smooth, 2 mm long. May.

330 Dry stony slopes in the middle mountain zone. — Caucasus: S. Transc. Described from S. Armenia (Eilar, Dzak). Type in Baku.

Note. We have not seen any specimens of this species and the diagnosis is based on the original description.

Series 6. *Ceratophyllae* Pobed. — Leaves nearly all radical, pinnate; floral leaves green, longer than calyx; flowers 1.5–2.5 cm long, white or yellow; upper stamens reduced to staminodes; inflorescence pyramidal, branched; densely white-tomentose plants.

52. *S. ceratophylla* L. Sp. pl. (1753) 27; Benth. Lab. Gen. et sp. 229; Ldb. Fl. Ross. III, 362; Benth. in DC. Prodr. XII, 287; Boiss. Fl. or. IV, 617; Grossg. Fl. Kavk. III, 322. — *S. clandestina* Benth. Lab. Gen. et sp. (1833) 240, p. p. (quoad pl. Talysch.) non L.

Perennial, 30–40 cm high, with a stout woody root; stem one-quarter to one-half the length of inflorescence, white-tomentose, leaves predominantly radical, 10–30 cm long, deeply pinnatifid, rugose, often with conical projections on upper surface and at margin, densely white-tomentose on both sides, the segments alternate, narrow, linear, obtuse, coarsely toothed to sublobate, the terminal segment usually several times as long as the lateral segments, rarely short; lower floral leaves undivided, lanceolate, long-attenuate at apex, erose-dentate; floral leaves broad-ovate to suborbicular, abruptly subulate-pointed, petioles covered with long taeniate hairs and long-stipitate glands; inflorescence pyramidal, with long strict branches; verticillasters 3–6-flowered; calyx campanulate, 10–12 mm long, cleft beyond the middle, broad in fruit, with spreading lips, covered with long taeniate hairs and long-stipitate glands, the upper lip with 3 short teeth, the middle tooth half the length of the upright lateral teeth, the lower lip with 2 longer teeth, all teeth subulate-pointed; calyx-tube membranous, prominently ribbed; corolla 1.5–2.5 cm long, plain yellow, with short tube, the rounded nectary-scale 1 mm long; upper lip of corolla subfalcate, short-pubescent on the back; middle lobe of lower lip broadly obovate, laterally extended, deeply concave; lateral lobes broadly oblong-elliptical; stamens slightly exserted; sterile anther-locules scarious, rectangular; upper stamens staminodial; style prominently exserted; lobes of stigma lilac, unequal; nutlets 3 mm long, subglobose, obtusely subtrigonal, dark brown, minutely and bluntly tuberculate. May–June.

Rocks, dry stony slopes, wormwood steppes; rarely as weed in cultivated fields. — Caucasus: S. Transc., Tal. Gen. distr.: Bal.-As. Min., Arm.-Kurd., Iran. Described from Iran. Type in London.

53. *S. semilanata* Czerniak. in Fedde, Report. 27 (1930) 279; Kudr. Mat. k izuch. shalf. Sr. Az. 21, pro syn. *S. ceratophylla* L.

Perennial; terminal leaf segment short, usually little different from lateral segments; verticillasters 1–2-flowered, rarely 3-flowered; floral leaves ovate, gradually tapering to a subulate point; calyx 14–17 mm long, the teeth longer than in preceding species, the tube always green, not scarious even in fruit; corolla white; nectary-scale half-rounded, 1 mm long and 0.75 mm broad. In other characters not differing from the preceding species. Second half of April to June.

Exposed stony slopes. — Centr. Asia: Mtn. Turkm. Described from Kopet Dag. Type in Leningrad.

Note. This species closely resembles the preceding. S. N. Kudryashev, who made a special study of Central Asian sages, placed *S. semilanata* among synonyms of *S. ceratophylla*. This treatment is, however, incorrect considering that the two species can be distinguished by a complex of characters, as indicated in the description.

Series 7. *Brachyanthae* Pobed. — Leaves nearly all radical, simple; floral leaves green, half the length to length of calyx; flowers 8–9 mm long, violet; staminodes absent; inflorescence paniculately branched; plants with arachnoid indument.

54. *S. brachyantha* (Bordz.) Pobed. in Addenda XX, 660. — *S. modesta* Boiss. var. *brachyantha* Bordz. in Zap. Kievsk. obshch. estestv. XXV (1915) 113; Grossg. Fl. Kavk. III, 320.

332 Perennial, 20 (30) 50 cm high; stem erect, simple, as long as or longer than inflorescence; leaves mostly radical, oblong or oblong-ovate, (4) 7 (10) cm long, (2) 3 (3.5) cm broad, obtuse, rounded or cuneate at base, erose-dentate, sometimes lobate, rugose, arachnoid on the veins or all over, the petiole longer than blade; cauline leaves 2–3 pairs, short-petioled, smaller; lower floral leaves sessile, long-attenuate toward apex, with similar indument; upper floral leaves membranous, sometimes violet-tinged, ovate, mucronate, small, half the length to length of calyx; inflorescence paniculate; verticillasters 8–10, the terminal sterile, the others 4–6-flowered, 1.5–2.5 cm apart, the lower 3 cm apart; calyx campanulate, slightly accrescent and in fruit 6–7 mm long, exceeding floral leaves, covered with fine crisp implexed hairs and multicellular hairs with inflated basal segment, the middle tooth of upper lip half the length of the widely spaced lateral teeth, the lower lip with 2 larger lanceolate teeth, these nearly half the length of calyx, all teeth subulately long-pointed; corolla violet, 8–11 mm long, the short tube included in calyx, the nectary-scale 0.5 mm long and 1 mm broad, deeply notched at apex; corolla lips equal or the lower longer; upper lip narrow, subfalcate, emarginate, densely covered with short thick-based hairs; lower lip with oblong lateral lobes, the middle lobe deeply concave, emarginate; sterile anther-locules deeply notched at the middle, surmounted by a narrow linear appendage; style barely exerted; stigma violet, the lobes unequal, rather thick; nutlets trigonous-ellipsoid, 3 mm long, light brown with darker reticulation. (Plate XV, Figure 3.)

Grassy and rocky slopes. — Caucasus: S. Transc. (Armenia). Gen. distr.: Arm.-Kurd. (Kars). Described from the village of Mastar, between Alagez (Aragats) and Bugutlu Mountains. Type in Leningrad.

Note. This species was considered by authorities of the Caucasian Flora to be *S. modesta* Boiss. However, the latter species does not occur at all in the Caucasus or in S. E. Turkey. It was described by Boissier from Cappadocia. The Herbarium of the Botanical Institute of U.S.S.R. Academy of Sciences contains specimens of *S. modesta* from Cappadocia (Sintenis) and from Phrygia (Bornmüller). They all differ markedly from specimens of the Caucasian species not only in having larger flowers — a character pointed out by E. Bordzilovskii — but also in their indument. As opposed to the Caucasian species, arachnoid hairs are confined in *S. modesta* to leaves and stem, whereas floral leaves and calyx are covered with thickened strict hairs intermixed with long-stipitate glands. The corolla-tube in *S. modesta* is distinctly exerted; in *S. brachyantha* it is included in calyx.

Series 8. *Beckerianae* Pobed. — Leaves evenly distributed along the stem, simple; floral leaves scarious, sometimes violet-tinged, soon deciduous, shorter than calyx; flowers



2–3.5 cm long, bright violet; staminodes absent; inflorescence simple or with one pair of lower branches.

- 333 55. *S. beckeri* Trautv. in Tr. Bot. sada, III (1875) 276; IX, 93; Boiss. Fl. or. IV, 624; Grossg. Fl. Kavk. III, 320. — *S. ruprechtii* Boiss. in herb.; Trautv. op. cit. IX, 95.

Perennial, 15–45 cm high; stem simple, erect, as long as or shorter than inflorescence, arachnoid, in inflorescence with short-stipitate glands and few short papilliform hairs; leaves evenly distributed along the stem, ovate to suborbicular, 3–6 cm long, 2.5–5 cm broad, rounded or subcordate at base, obtusish, finely erose-dentate, rugose, green above with sparse arachnoid pubescence, white-tomentose beneath; petioles 1–2.5 cm long, white-arachnoid; leaves subtending inflorescence much shorter, sessile; floral leaves soon deciduous, scarious, ovate, sessile, amplexicaul, short-pointed, sometimes violet-tinged, covered with short pointed broad-based hairs intermixed with short-stipitate glands and with sessile golden glands; inflorescence simple or with a pair of branches at base, these not reaching the summit of stem; verticillasters 2–4 cm apart, 2–6-flowered; calyx campanulate, covered outside with multicellular hairs with inflated basal segment as well as short- and long-stipitate glands, copiously covered inside with short glandular hairs, the upper lip rounded, with a very short middle tooth and connivent lateral teeth, lower lip with 2 long lanceolate teeth, all teeth finely subulate with an incurved point; corolla large, 2–3.5 cm long, bright violet, the tube prominently exserted, the nectar-scale linear, bent, glandular-hairy at upper margin; upper lip of corolla falcate, flattened, puberulent on the back; lower lip with elongated oblong acute lateral lobes, the middle lobe broadly obcordate, broader than long, deeply concave, puberulent beneath; sterile anther-locules oblong, 2–3 mm long, attenuate at base; stamens and style prominently exserted; stigma lilac, with unequal lobes; nutlets trigonous-globose, 3 mm long, yellowish, turning brown in maturity, with dark-brown reticulation. June–July.

Stony taluses in lower mountain zone. — Caucasus: Cisc., Dag. Endemic. Described from S. Dagestan (Akhty). Type in Leningrad.

- Note. In his description of this species, Trautvetter identifies it with *S. phlyctidea* C. Koch, an enigmatic species described from Georgia and not represented by any herbarium specimens. Koch's description of *S. phlyctidea* is very brief and does not contain a single feature applicable to *S. beckeri*. We refrain, however, from combining the two species since no specimens of *S. beckeri* have ever been collected in Georgia.
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Section 3. **Macrocalyx** Pobed. sect. n. in Addenda XX, 66. — Calyx campanulate, becoming one-and-a-half times as long in fruit, cleft halfway to base, the upper lip of corolla about as long as or shorter than lower lip, slightly curved; floral leaves exstipulate; perennials.

56. *S. insignis* Kudr. Mat. k izuch. shalf. Sr. Az. (1936) 19. — **Ис.:** op. cit. Fig. 1.

Perennial, 20–25 cm high, with a long slender vertical root; stem solitary, short, as long as or slightly longer than inflorescence, sparingly tomentose with a lining of short-stipitate glands, in inflorescence also with short thick bristly retrorse hairs, in upper part of inflorescence and on branches mainly with long-stipitate glands; leaves predominantly radical, broad-ovate to suborbicular or elliptical, 8–10 cm long, 6.5–9.5 cm broad, obtuse or half-rounded at apex, cordate, erose-dentate, covered beneath with short tomentum and scattered sessile glands, sparsely puberulent or subglabrous above, long-petioled, the petiole longer than blade, white-tomentose; lower cauline leaves smaller; leaves subtending inflorescence scarious, sessile, broad-elliptical, short-pointed, whitish-green, with sparse short pubescence beneath mainly on the veins; floral leaves broad-ovate, exceeding the calyx and often covering the corolla, short-pointed, sessile, clasping, scarious, pinkish, covered beneath with short crisp hairs; inflorescence with 1 or rarely 2 pairs of branches not exceeding the summit of stem; verticillasters crowded, 1–1.5 cm or rarely 2 cm apart, 2–4-flowered, 2 flowers often abortive; calyx campanulate, 1.5–2 cm long, accrescent or 2.5–3 cm in fruit, covered outside with short thick multicellular pointed hairs intermixed with short-stipitate glands mainly on the veins, sparsely puberulent inside, sometimes lilac, bilabiate nearly to the middle; upper calyx-lip longer than the lower, with connivent teeth, the middle tooth half the length of the lateral teeth; lower lip with 2 longer finely pointed glandular-pubescent teeth; corolla apparently pink, the tube completely included, with a small bundle of hairs in throat; upper lip of corolla short, about equaling the upper, slightly curved, suberect, 335 puberulent outside, with scattered sessile glands; lower lip with elliptical strict lateral lobes, the broadly obovate middle lobe scarcely concave, emarginate, with unevenly and obtusely toothed margin; stamens exserted; sterile anther-locules rectangular, scarious, scarcely notched at middle; upper stamens reduced to short staminodes with very small arched sterile anthers; style violet, exserted; stigma more intensely colored, with subequal lobes; nutlets ellipsoid, faintly trigonous, 3.5 mm long, greenish with brown reticulation. May–June.

Stony mountain slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Babatag range. Type in Leningrad.

Section 4. **Plethiosphace** Benth. in Hook. Bot. Misc. 3 (1833) 373; Lab. Gen. et sp. 230 et in DC. Prodr. XII, 288; Boiss. Fl. or. IV, 626. — Calyx broadly campanulate, the upper lip rounded, with 3 connivent teeth, strongly reflexed in fruit, bisulcate; corolla mostly small, the upper lip curved, suberect or rarely falcate; floral leaves exstipulate; flowers predominantly violet or blue; perennials.

Series 1. *Pratenses* Pobed. — Stamens and style one-and-a-third to one-and-a-half times as long as upper lip of corolla; flowers dark to pale violet or violet-blue; floral leaves green, much shorter than calyx; inflorescence erect; verticillasters more or less distant; plants with glandular indument.

57. *S. pratensis* L. Sp. pl. (1753) 25; Georgi, Besch. d. Russ. R. III, 658; Benth. Lab. Gen. et sp. 233; Ldb. Fl. Ross. III, 363; Benth. in DC. Prodr. XII, 289; Boiss. Fl. or. IV, 626; Shmal'g. Fl. 319; Hegi, III. Fl. V, 4, 2496; Grossg. Fl. Kavk. III, 324. — *Sclarea pratensis* Moench, Meth. pl. (1794) 375. — Ic.: Dietr. Fl. Boruss. II, tab. 118. — Exs.: Fl. lithuan. No. 16, 86; Fl. exs. Austro-Hung. No. 950; Fl. ailes. No. 919; Fl. Gall. et Germ. No. 607; Fl. Boh. et. Mor. No. 884.

Perennial, 30–70 cm high; stem simple, erect, longer than inflorescence, leafy, covered from base with long implexed multicellular hairs (these with flat broad segments disposed in different planes), on lower internodes with few long-stipitate glands, on upper internodes and in inflorescence (especially in its upper part) with numerous long- and short-stipitate glands; radical leaves oblong or ovate, (4.5) 10–11 (15) cm  
336 long, (2) 4 (7) cm broad, obtuse, subcordate or rounded at base, doubly denticulate or crenate, glabrous above or nearly so, with isolated hairs on the veins, covered beneath on the veins with long multicellular or short thick-based hairs, the pubescent petiole as long as or longer than blade; lower cauline leaves smaller, short-petioled; upper cauline leaves very small, sessile; lower floral leaves ovate-lanceolate, long-acuminate, sessile, clasping, crenate, rugose, glabrous or with isolated short-stipitate glands above, densely implexed-hairy beneath; floral leaves orbicular, clasping, long-acuminate, terminating in a short point, entire, puberulent above, densely implexed-hairy beneath, small, slightly exceeding the pedicels, much shorter than calyx, spreading at anthesis, reflexed in fruit; inflorescences simple or with 1 or 2 pairs of lower branches; verticillasters 5–10, 4–6-flowered, approximate, the lower subdistant; flowers on some plants hermaphrodite, large, on others female, smaller, violet, often retaining their color in the herbarium, rarely pink or white; pedicels 3–5 mm long, densely covered with short strict hairs; calyx 9–11 mm long, campanulate, covered outside with long multicellular hairs and profuse long-stipitate glands, inside in upper part with short appressed hairs; upper lip of calyx shorter than the lower, semiorbicular, with 3 very short approximate teeth, the middle tooth shorter than the lateral, lower lip with 2 fairly long lanceolate teeth, all teeth subulate-pointed; corolla 3 cm long, the tube slightly dilated at throat, prominently exserted, with a bent strip of squamiform hairs inside; upper lip of corolla falcate, broad, longer than the lower, covered outside with short-stipitate glands and scattered sessile glands; lower lip with oblong or elliptical lateral lobes, the middle lobe broad, emarginate, deeply concave; stamens slightly exserted; sterile anther-locules scarcely notched, surmounted by an acute triangular process of the connective; upper stamens staminodial; style long, greatly exceeding the corolla; lobes of stigma unequal; nutlets trigonous-globose, 2 mm in diameter, brown, obscurely dark-striate.

Dry meadows, forest glades, pine woods and roadsides. — European part: Balt., U.V., U. Dnp., M. Dnp., V.-Don, L. Don, U. Dns., Bes., Bl., Crim. (northern slopes near Krasnogorskoe village). **Gen. distr.:** Scand., Centr. and Atl. Eur., W. Med. Described from W. Europe. Type in London.

337 **Economic importance.** Steam distillation of dried herbage yielded 1.15% essential oil.

58. *S. dumetorum* Andrzej. Cat. pl. Jard. Bot. de Krzemieniec (1811) No. 288; Bess. Enum. Pl. Volhyn. 3, 40; Ldb. Fl. Ross. III, 364, p. p.; Benth. in DC. Prodr. XII,



290, p. p. — *S. pratensis* L. *β. dumetorum* Schmalh. Fl. (1897) 319, p. p. — *lc.*:  
Rechb. *lc. fl. Germ.* XVIII, tab. 1252.

Perennial, 30–60 cm high; stems long, bearing a single inflorescence, simple, leafy, covered from base with long implexed multicellular hairs (the flat broad segments in different planes) on lower internodes intermixed with few long-stipitate glands, on upper internodes and in inflorescence (especially in its upper part) profusely glandular; radical leaves numerous, oblong or subovate, (6) 8 (11) cm long, (2.5) 3 (5) cm broad, obtuse, subcordate or rounded at base, doubly denticulate or crenate, glabrous above, sparsely covered beneath, especially on veins, with long multicellular or short thick-based hairs, the petiole as long as or shorter than blade, covered with long multicellular hairs and few long-stipitate glands; middle cauline leaves mostly larger than the radical, short-petioled or sessile; upper cauline and lower floral leaves long, narrow, lanceolate, acute, sessile, clasping, crenate, rugose, glabrous or with solitary short-stipitate glands above, with long fine implexed hairs beneath; upper floral leaves orbicular, long-acuminate, clasping, entire, glabrous or puberulent above, densely implexed-hairy beneath, exceeding the pedicels, shorter than calyx, spreading in flower and often in fruit; inflorescences simple or with 1–2 pairs of lower branches; verticillasters 4–6-flowered, approximate, the lower subdistant; hermaphrodite flowers larger; female flowers on some plants smaller, dark violet, rarely white; pedicels 2–2.5 mm long, covered with short patent white hairs; calyx 7 mm long, covered with simple multicellular hairs and long-stipitate glands, inside in upper part with short appressed hairs; upper lip of calyx semiorbicular, shorter than the lower, with very short convergent teeth, the middle tooth shorter than the lateral; lower lip with 2 rather long lanceolate teeth; all teeth subulate-pointed; corolla 1–2 cm long, the tube slightly and gradually dilated toward throat, exserted, with a band of squamiform hairs inside;  
338 upper lip of corolla suberect or slightly curved, narrow, about as long as the lower, covered outside with short-stipitate and scattered sessile glands; lower lip with oblong or elliptical lateral lobes, the middle lobe broad, transversely elliptical, emarginate, deeply concave; stamens exserted; sterile anther-locules surmounted by a small process; style long, prominently exserted; lobes of stigma slightly unequal; nutlets globose, obtusely trigonous, 2 mm in diameter, dark brown to nearly black. May–July.

Mountain slopes, slides, grass plots and thin mountain woods. — European part:  
U. Dns., Bes. *Gen. distr.*: Centr. Eur. Described from Volyn'. Type in Kiev?

59. *S. stepposa* Schost. in *Izv. Gl. bot. sada AN SSSR*, XXX (1931) 669; Kryl. Fl. Zap. Sib. IX, 2369. — *S. dumetorum* Ldb. Fl. alt. I (1824) 24, non Andr.; Benth. Lab. Gen. et sp. 234 et in DC. Prodr. XII, 290, p. p.; Ldb. Fl. Ross. III, 364, p. p.; Kryl. Fl. alt. 1018. — *S. pratensis* var. *dumetorum* Briq. Lab. Alp. Marit. II (1893) 530, p. p. et in *Pflanzenfam.* IV, 3a, 3b (1897) 276, p. p.; Shmal'g. Fl. II, 319, p. p.

Perennial, 25–50 cm high; stems solitary or mostly several, sparsely covered below with short hairs, more densely so above and with some longer thick-based and often retrorse hairs, in inflorescence also with numerous sessile glands; radical leaves persistent in flower (only in Central Asian plants small and marcescent), oblong-ovate,

(8) 6 (2.5) cm long, (1.5) 3.5 (5.5) cm broad, acuminate, cordate, doubly and coarsely dentate or crenate, slightly rugose, glabrous or lower side with sparse short hairs mainly on the veins, the petiole longer than the blade; lower cauline leaves resembling the radical but slightly smaller; upper leaves much smaller, sessile; lower floral leaves broadly lance-ovate, long-acuminate, sessile, clasping; upper floral leaves ovate, long-attenuate to a short point, shorter than to slightly longer than calyx, covered beneath (especially at margin) with long fine multicellular hairs intermixed with short thick-based hairs and long-stipitate glands; inflorescence shorter than stem, simple or with 1 pair of branches at base; verticillasters distant, 4–6-flowered; flowers hermaphrodite or mixed with female or all flowers female; calyx campanulate, 5–7 mm long, 339 covered with long fine hairs and long-stipitate glands, often violet-tinged; upper lip of calyx semiorbicular, with very short approximate teeth; lower lip with 2 longer and more pointed teeth; corolla violet-blue, 15–20 mm long, the tube with a short thick band of squamiform hairs; upper lip falcate, emarginate, with short-stipitate glands on the back; lower lip with oblong elongated strict lateral lobes, the middle lobe broad, deeply concave, emarginate, covered beneath with long implexed hairs; both lips with scattered sessile glands; stamens not exceeding the corolla; sterile anther-locules with prominent rounded upper angles, surmounted by short appendages; upper stamens reduced to short staminodes; nutlets 1.5 mm long, ellipsoid, dark brown, obscurely dark-striate. June–July. (Plate XVI, Figure 2.)

Steppes and dry steppe meadows. — European part: V.-Kama, M. Dnp., V.-Don, Transv., Bl. W. Siberia: U. Tob., Irt., Alt.; Centr. Asia: Ar.-Casp. Endemic. Described from the Ukraine. Type in Kiev.

60. *S. kuznetzovii* Sosn. in Tr. Az. FAN SSSR, I (1933) 45. — *S. pratensis* var. *caucasica* Kuznetz. in sched. ad Herb. pl. exs. hort. Bot. Juriev.; Grossg. Fl. Kavk. III, 324.

Perennial, 20–80 cm high; stem simple, shorter than inflorescence, covered in lower part with long taeniate hairs, these sparser on middle internodes, more copious and intermixed with long-stipitate glands in inflorescence; leaves evenly distributed along the stem, ovate, (6) 8 (12) cm long, (2.5) 4.5 (5.5) cm broad, acute, cordate, doubly denticulate, smooth or scarcely rugose at margin, glabrous or with isolated hairs above, with short strict thick-based hairs on the veins beneath, the petioles as long as blade; middle leaves short-petioled; upper cauline leaves and those subtending inflorescence much smaller, sessile; floral leaves suborbicular, sessile, clasping, short-acuminate, much shorter than calyx, about equaling or slightly exceeding the calyx, covered at margin and beneath with long fine multicellular hairs and numerous long-stipitate glands, spreading, often reflexed in fruit; inflorescence several times as long as the stem, with 2 or 3 pairs of virgate branches nearly reaching the summit of inflorescence; verticillasters distant, 4–6-flowered; pedicels one-third the length of calyx, densely patent-hairy; calyx 8–9 mm long, covered with long fine multicellular hairs 340 and numerous long-stipitate glands; upper lip of calyx semiorbicular, with 3 minute approximate subequal teeth; lower lip with 2 teeth one-quarter the length of calyx; all teeth terminating in a very short point; corolla 2.5 cm long, violet, the tube 5–6 mm long, completely included in calyx; upper lip exceeding the lower, scarcely curved,

narrow, 12 mm long, emarginate, covered with short simple flat and short-stipitate glands; lower lip with oblong obtuse strict lateral lobes, the middle lobe suborbicular, attenuate toward base, unevenly and coarsely toothed; stamens exserted one-third the length of upper lip; sterile anther-locules deeply notched at the middle, surmounted by 2 short processes; style diffusely pubescent, prominently exserted; lobes of stigma subequal; nutlets 2 mm long, subglobose, obtusely trigonous, brown, dark-striate. May–July. (Plate XVI, Figure 1.)

Stony calcareous slopes in the middle mountain zone. — Caucasus: Cisc. Endemic. Described from the Ust'-Dzhegutinsk-Khumar area. Type in Leningrad.

61. *S. virgata* Jacq. Hort. Vind. I (1770) 14; Ait. Hort. Kew. ed. 1, 1, 39; Benth. Lab. Gen. et sp. 234; Ldb. Fl. Ross. III, 364; Benth. in DC. Prodr. XII, 240; Boiss. Fl. or. IV, 627; Grossg. Fl. Kavk. III, 323. — *S. caucasica* Schrank in Syll. Pl. Soc. Ratisb. 2 (1828) 58. — *S. taurica* et *S. taurina* Hortul. ex Benth. Lab. Gen. et sp. (1832) 235. — Ic.: Jacq. l. c. tab. 37.

Perennial, 50–100 cm high; stem solitary, erect, simple, shorter than inflorescence, rarely as long, leafy, covered in lower part with long taeniate hairs, these intermixed above with long-stipitate glands, in inflorescence more copious, intermixed with short thick-based retrorse hairs and short-stipitate glands; radical and lower cauline leaves elliptical-oblong or ovate-oblong, (7.5) 9–10 (15.5) cm long and (3.5) 4.5–5.5 (7) cm broad, obtuse or rounded at apex, subcordate at base, crenate, doubly crenate or sublobate, rugose, glabrous or with sparse short appressed hairs above, rather densely covered beneath with long implexed multicellular hairs or intermixed with short thickened hairs and sometimes short-stipitate glands, the petioles shorter than blade, densely covered with long implexed multicellular hairs and long-stipitate glands; upper cauline and lower floral leaves small, lanceolate, long-attenuate toward apex, sessile, clasping, 341 sublobate, the indument as on other leaves but more copious; upper floral leaves orbicular, attenuate at apex and terminating in a subulate point, glabrous above, covered at margin and beneath with long multicellular hairs; inflorescence very long, with 2 or 3 pairs of long strict virgate branches nearly reaching the summit of inflorescence; verticillasters up to 20–40, distant, 6-flowered; pedicels one-third the length of calyx, white-pubescent, often reflexed in fruit; calyx 8–9 mm long, covered with simple [?] and long-stipitate large-headed glands; upper lip of calyx shorter than the lower, semiorbicular, with 3 short approximate teeth, the lateral subhorizontally divergent, the middle smaller; lower lip with 2 long lanceolate teeth, all teeth subulate-pointed; corolla whitish, the short tube included in calyx; upper lip of corolla slightly curved, about as long as the lower, covered outside with long fine multicellular hairs and with short-stipitate and sessile glands; lower lip with oblong-elliptical obtuse lateral lobes, the middle lobe broader than long, deeply concave; stamens slightly exserted; lower anther-locule scarious, surmounted by a short pointed process; style prominently exserted; lobes of stigma unequal; nutlets globose, obtusely trigonous, 2 mm in diameter, dark brown, minutely tuberculate. June–October.

Meadow slopes in mountains, wood glades, margins of walnut and broad-leaved woods, often as weed at field margins. — European part: Crim., E. Transc., Tal.; Centr. Asia: Pam.-Al., T. Sh. Gen. distr.: W. Med., Bal.-As. Min. Described from



a cultivated specimen grown from seed obtained under the *S. pyrenaica* L., apparently from Italy. Type probably in London.

**Economic importance.** A test made with plants from Gissar range showed an insignificant output of essential oil, hence exploitation for oil production appears to be unprofitable (Kudryashev in Tr. Sredneaz. nauchno-issled. opytn. stants. efiromasl. rast. 1, 1932, 57).

62. *S. turcomanica* Pobed. sp. n. in Addenda XX, 661. — *S. virgata* auct. fl. As. Med.

Perennial, 50–100 cm high; stems several, simple, rarely branching or with branches only in inflorescence, erect, longer than inflorescence, leafy, covered with short fine appressed hairs intermixed with short-stipitate glands, in inflorescence more profusely glandular-hairy; radical leaves marcescent; lower cauline leaves oblong-elliptical or ob-  
342 long-lanceolate, (4) 12 (12.5) cm long, (1.2) 3.5 (5.5) cm broad, obtuse, rounded or subcordate at base, doubly crenate, glabrous above or with scattered short hairs on the midvein, rather densely covered beneath with short fine hairs at angles of veins and numerous short-stipitate and sessile glands between them, the petioles shorter than blade; middle cauline leaves smaller, acute, short-petioled to subsessile; rameal and lower floral leaves small, sessile, lanceolate, densely lanate (especially beneath); upper floral leaves scarious, shorter than calyx, lance-ovate, point-tipped, sessile, clasping, with scattered short appressed hairs above, and dense short hairs beneath; inflorescence long, with 1–3 pairs of long divaricate branches, more rarely simple; verticillasters 12–18, the upper approximate, the lower distant, 4–6-flowered; pedicels half the length of calyx, covered with short patent hairs, reflexed in fruit; calyx 8–9 mm long, puberulent on the veins and copiously glandular between them; upper lip of calyx shorter than the lower, semiorbicular, with 3 minute teeth; lower lip with 2 longer lanceolate teeth, all teeth subulate-pointed; corolla violet,  $2\frac{1}{2}$  times as long as calyx; upper lip somewhat longer than the lower, erect or slightly curved, covered outside with numerous short simple hairs and scattered sessile glands; lower lip with oblong obtuse strict lateral lobes, the middle lobe broad, rounded, broader than long, undulate-margined, deeply concave; stamens not exserted, the connective unappendaged; style slightly exceeding the upper lip; lobes of stigma subequal; nutlets brown, smooth, trigonous-ellipsoid, 1.5–2 mm long. Second half of April to July.

Mountain slopes. — Centr. Asia: Pam.-Al., Mtn. Turk. Described from Kopetdag (Ioldere Pass). Type in Leningrad.

Note. We refer to this series the species *S. lalesarica* Rech. fil., described by Rechinger from S. Iran (Kerman) and erroneously placed by this authority in the subsection Gongrosphace.

63. *S. sibthorpii* Sm. ex Sibth. et Sm. Prodr. Fl. Gr. 1 (1806) 16; Benth. Lab. Gen. et sp. 236; Ldb. Fl. Ross. III, 365; Benth. in DC. Prodr. XII, 291. — *S. campestris* M. B. Fl. taur.-cauc. I (1808) 20. — *S. pratensis* L.  $\gamma$ . *sibthorpii* Schmalh. Fl. II (1879) 319. — *S. verbenaca* L.  $\alpha$ . *serotina* Boiss. Voy. Bot. Esp. (1839–1845) 484. — Ic.: Sibth. et Sm. l. c. tab. 22.

- 343 Perennial, 30–60 cm high; stem much shorter than inflorescence, leafless or with 1–3 pairs of small sessile leaves, densely covered from base with long taeniate hairs (in Balkan specimens intermixed with long-stipitate glands), in inflorescence also with short appressed thick-based retrorse hairs and often with long-stipitate glands; leaves nearly all radical, oblong, (4.5) 9 (16) cm long, (3) 5 (8) cm broad, obtuse, cordate, doubly crenate-dentate, rugose, the upper side green, glabrous or pubescent on the veins, the lower side whitish with copious short thick-based hairs and sometimes with few short-stipitate glands, the petiole as long as or shorter than blade; cauline leaves usually smaller, sessile, broadly lanceolate, pubescent on both sides, the lower short-petioled and differing from the radical only in smaller size; lower floral leaves resembling the sessile cauline leaves; floral leaves suborbicular, shorter than calyx, attenuate at apex to a short point, entire, densely covered beneath with taeniate hairs, glabrous above, in maturity reflexed, rarely appressed; inflorescence very long, paniculate, several times as long as stem, the branches often reaching the summit of inflorescence, the lowest sometimes arising from the first internode; verticillasters 8–20, subdistant, the lower more widely spaced, 4–6-flowered; pedicels half the length of calyx, densely white-pubescent; calyx 6–8 mm long, broadly campanulate, with scattered long-stipitate glands especially on the ribs and often with long taeniate hairs; upper lip of calyx with very short approximate teeth, the middle slightly shorter than the lateral; lower lip with longer lanceolate teeth, all teeth subulately short-pointed; corolla pale violet, 2–2½ times as long as calyx, the tube with a narrow inconspicuous band of nectary-hairs; upper lip falcate, densely covered outside with glandular hairs and copious sessile golden-colored glands; lower lip densely covered outside with sessile glands, the lateral lobes oblong, obtuse, strict, the middle lobe twice as broad as long, deeply concave, entire; sterile anther-locules scarcely notched, surmounted by 1 or 2 acute appendages; fertile locules slightly exserted, dark violet; upper stamens reduced to small staminodes; style slightly exserted; lobes of stigma unequal; nutlets 344 2 mm long, trigonous-globose, dark brown, smooth, falling off in maturity together with calyx. Second half of June to September.

Grassy meadows and roadsides. — European part: Crim.; Caucasus: E. Transc.

**Gen. distr.:** Bal.-As. Min. Described from Greece. Type in London.

**Note.** A glandular-pubescent form of this species occurs all over the distribution area. A completely eglandular form occurs less frequently in Crimea.

Series 2. *Nemorosae* Pobed. — Floral leaves exceeding the calyx, imbricated in the bud, violet, the lower rarely green; inflorescences erect, with short or long branches; calyx persistent in maturity; stamens concealed under upper lip or slightly exserted together with style; upper lip of corolla slightly falcate; flowers blue; plants eglandular or the indument lined with short-stipitate glands.

64. *S. nemorosa* L. Sp. pl. (1762) 35; Georgi, Besch. d. Russ. R. III, 4, 658; M. B. Fl. taur.-cauc. I, 20, p. p.; Vahl, Enum. pl. I, 267, p. p. — *S. silvestris* Jacq. Fl. Austr. III (1775) 7, non L. — *Sclarea punctata* Moench, Meth. pl. (1794) 374. —

*S. nemorosa* Mill. Gard. Dict. VIII (1768) No. 6. — Ic.: Jacq. l. c. tab. 212; Rchb. Ic. bot. tab. 526. — Exs.: Fl. Pol. exs. No. 766; Fl. exs. Austro-Hung. No. 948.

345 Perennial, 30–60 cm high; stem solitary simple, erect, several times as long as inflorescence, rather densely leafy, villous from base, rarely with some longer hairs, the indument denser on inflorescence; lower cauline leaves oblong to subovate, (3.5) 5–6 (10) cm long, (1.5) 2–2.5 (3) cm broad, acute, subcordate or almost rounded at base, smooth or slightly rugose only at margin, crenate, glabrous above, villous on the veins beneath, the petiole about as long as or shorter than blade, villous, channeled, ciliate at margins of channel, dilated at base; cauline leaves, progressively longer toward summit, short-petioled, the upper sessile, ovate to lanceolate, more or less acuminate; floral leaves large, equaling or exceeding the calyx, imbricated in bud, reflexed in fruit, violet, suborbicular, short-pointed, sessile, clasping, glabrous above, with short appressed hairs beneath, white-ciliate at margin; inflorescences simple or with 1–2 pairs of long slender branches reaching the summit or nearly so; verticillasters 14–30, approximate (to 0.5 cm apart), the lower 1–1.5 cm apart, 4–6-flowered; pedicels white-pubescent, half the length of calyx; calyx 5–6 mm long, bilabiate nearly halfway to base, villous only on the nerves; upper lip of calyx rounded, with 3 approximate teeth, the middle tooth shorter; lower lip longer than the upper, the teeth abruptly acuminate, upright; corolla 8–10 mm long, bluish-violet, with a pronounced band of squamiform hairs in the tube; upper lip slightly falcate, with short white hairs on the back and at apex and with large sessile glands; middle lobe of lower lip transversely elliptical, deeply concave, often appressed to calyx; lateral lobes short, obtuse, oblong, strict; sterile anther-locules with a rather deep notch below the middle; style slightly exserted; lobes of stigma subequal; nutlets obtusely trigonous-globose, 1.5 mm long, dark brown, ventrally and dorsally dark-striate. May–July.

Steppes, steppe slopes, dry valley meadows, borders. — European part: M. Dnp., V.-Don, U. Dns., Bes., Crim. (foothill areas). Gen. distr.: Centr. Eur. (common), Bal.-As. Min. Described from Centr. Europe. Type in London.

Note. This species has been repeatedly confounded and even identified with *S. silvestris* L. The first botanist to distinguish clearly between them was Kerner who described both species from Hungary — the classical location. Examination of herbarium material has shown that only *S. nemorosa* L. occurs in U.S.S.R., in the western part of European territory. It displays great variability. Beside specimens with stem almost glabrous at base and appressed-pubescent calyx-nerves, there is a form densely covered from base of stem with short appressed hairs and similarly hairy calyx. The geographical distribution of these forms is not clear. In the southern part of the distribution area, at points of contact with the next species (*S. tesquicola* Klok. et Pobed.), there are hybrid forms clearly recalling the parent species.

65. *S. tesquicola* Klok. et Pobed. in Addenda XX, 662. — *S. silvestris* auct. non L.: Ldb. Fl. Ross. III, 365; Benth. Lab. Gen. et sp. 237, p. p. et in DC. Prodr. XI, 292, p. p.; Boiss. Fl. or. 628, p. p.; Shmal'g. Fl. II, 320, p. p.; Kryl. Fl. Zap. Sib. IX, 2371, p. p. — *S. nemorosa* Grossh. Fl. Kavk. III (1932) 324, p. p. — *S. nemorosa* f. *albiflora* N. Pop. in Grossh. op. cit. 324, p. p. — *S. taurica* Bess. in Herb. — Exs.: GRF, No. 834.



Perennial, covered from base with fine multicellular and taeniate hairs and minute short-stipitate glands; leaves mostly ovate-oblong, (3.5) 7 (11) cm long, (1.2) 2.5 (4) cm broad, rugose, villous on both sides and covered with minute short-stipitate glands; up-  
346 per cauline leaves often very broad, rounded, long-acuminate, coarsely sharp-dentate; floral leaves typically long-acuminate, but often rounded and short-pointed like those of *S. nemorosa*, the margin white-ciliate; flowers 8–12 mm long; calyx typically bilabiate to one-quarter or one-third but often indistinguishable from the calyx of *S. nemorosa* but always more densely hairy and the hairs longer than in *S. nemorosa*; ring of squamiform hairs in calyx-tube absent or obsolescent; middle lobe of lower corolla-lip rounded, slightly concave. Otherwise indistinguishable from *S. nemorosa* L. May–September.

Sands, dry river beds, stone outcrops, sandy river banks, steppes, juniper woods, gullies, and oak forests. — European part: U. V., V.-Kama, V.-Don., Transv., Bl., Crim. (especially southern coast), L. Don.; Caucasus: Cisc., W. E. and S. Transc.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp. Described from Kamennaya Steppe. Type in Leningrad.

Note. Kerner listed *S. silvestris* L. among hybrids between *S. pratensis* and *S. nemorosa* and this seems indeed to explain the origin of this species. Two species were later wrongly included in *S. silvestris*, namely the East European *S. tesquicola* Klok. et Pobed. and the Siberian *S. deserta* Schang. They both differ from the hybridogenous West European *S. silvestris* in having a more densely hairy and more leafy stem and thus representing independent geographical races.

A distinctive small-flowered form predominates in the northern, steppe part of Central Asia; a form with larger flowers is to be found together with it only on the Cisvolga Plateau.

**Economic importance.** At flowering time, the herbage contains 0.01–0.04% agreeably scented essential oil.

66. *S. deserta* Schang. in Ldb. Suppl. II Ind. sem. hort. Acad. Drop. (1824) 6. — *S. silvestris* auct. fl. As. Med. — *S. nemorosa* auct. fl. As. Med. — Ic.: Rchb. Ic. bot. tab. 528.

Perennial, 45–80 cm high; stems several, longer than inflorescence, erect, branched in upper part, densely covered from base with fine retrorse multicellular or profuse  
347 long taeniate hairs and short-stipitate glands, more densely covered in inflorescence with strict hairs and stipitate glands; radical leaves small, marcescent; lower staminate leaves oblong to oblong-ovate, (5) 7 (9) cm long and (1) 2.5 (3.75) cm broad, cordate, acute, doubly crenate, rugose, green and short-villous above, grayish beneath with dense villous pubescence (mainly on the veins), the petiole as long as or shorter than blade; middle cauline leaves larger, short-petioled; upper leaves much smaller, ovate or long-acuminate, sessile or subsessile; lower floral leaves mostly broadly rounded, abruptly long-pointed, coarsely sharp-toothed, with similar indument; upper floral leaves ovate, short-pointed or more or less attenuate at apex, sessile, green or violet, imbricated in the bud, puberulent above, with more numerous and somewhat longer hairs beneath, entire, with long white cilia at margin, elongate in fruit and appressed to inflorescence axis; inflorescence on main axis with 1–2 pairs of branches, these exceeding the axis;

rameal inflorescences simple; verticillasters 20–25, approximate (0.5 cm apart), the lower 1–1.5 cm apart, 4–6-flowered; pedicels white-pubescent, half the length of calyx, with 2 small linear red white-pubescent bracts; calyx 7 mm long, bilabiate to one-third its length, densely covered on the nerves with white spreading short multicellular eglandular hairs, sparsely and inconspicuously hairy between the nerves; upper lip of calyx rounded at apex, with minute approximate teeth, the middle scarcely shorter than the lateral; lower lip longer than the upper, the ovate short-acuminate teeth slightly inflexed; corolla dark violet (?), 10–16 mm long, covered outside with short white hairs, the tube with a pronounced band of squamiform hairs; upper lip suberect, scarcely curved, enlarged toward apex; lower lip with oblong obtuse strict lateral lobes, the middle lobe orbicular or broadly obovate, slightly concave; fertile anther-locules 2 mm long; sterile locules with a deep notch at the middle; style and stamens slightly exserted; lobes of stigma subequal; nutlets 1.5–2 mm long, obtusely trigonous-globose, or trigonous-ovoid, scabrous, dark brown with darker stripes. April–September.

Steppe slopes in mountains, forest margins, river banks, sometimes as weed in cultivated fields.—Caucasus: all regions; W. Siberia: Alt.; Centr. Asia: Balkh., Dzu.-Tarb., Syr D., T. Sh. Described from Altai. Type unknown.

348 Note. We are reestablishing this forgotten species, long disregarded in the literature. It may be mentioned that we have seen specimens of *S. tesquicola* from the European part of the U.S.S.R. (Krasnoarmeisk) that resembled *S. deserta*. It is possible that a distinct large-flowered race occurs on the mountain-steppe slopes in Central Asia. Mutual hybridization occurs where the three species grow together.

**Economic importance.** Tests carried out on plants from wild stands of *S. deserta* Shang. by the River Talas in Central Asia, showed a 0.02% output of pale yellow essential oil easily separable from water. Aldehyde extraction tests gave satisfactory results. The low yield of essential oil and lack of sufficiently large supply would render distillation of oil from *S. deserta* unprofitable.

Dry seeds of this species contain a considerable amount of drying oil (16.65%). After a certain time the oil acquires an unpleasant odor and is therefore unsuitable for feeding purposes but it can be used for production of paints and varnishes. *S. deserta* is a valuable nectariferous plant.

Series 3. *Fugaces* Pobed. — Floral leaves at most half the length of calyx, not imbricated in the bud; calyx falling off in maturity.

67. *S. fugax* Pobed. in Addenda XX, 663. — *S. nemorosa* auct. fl. Cauc. — *S. silvestris* auct. fl. Cauc.

Perennial, 30–80 cm high; stem simple or branched nearly from base, leafy, densely covered from base (more copiously in inflorescence) with short simple thick-based appressed retrorse hairs, the branches long, slender, often reaching the summit of main stem; lower and middle cauline leaves ovate-oblong or oblong, (4) 5–5.5 (6) cm long, (1) 2 (2.5) cm broad, obtuse to acute, cordate or rounded at base, coarsely or finely double-crenate, villous on both sides, green above, grayish beneath, rugose; upper

cauline and rameal leaves small, lanceolate, sessile; floral leaves suborbicular, more or less long-attenuate at apex, sessile, clasping, the lower green, the upper faintly violet-tinged, covered on both sides (more densely beneath) with short appressed hairs, with long white cilia at margin, reflexed in fruit; inflorescences branched at ends of stems and branches; verticillasters 15–25, 0.5–2.5 cm apart, 4–6-flowered; pedicels with dense  
 349 short hairs, equaling the calyx, with 2 minute linear pubescent bracts; some flowers ebracteate; calyx 5–8 mm long, bilabiate nearly halfway down to base, falling off in maturity, densely covered outside with short hairs, inside in upper half with short-stipitate glands and simple appressed antrorse hairs; upper lip rounded, with 3 equal teeth or the middle tooth shorter; lower lip longer than the upper, with 2 longer lanceolate slightly incurved teeth; all teeth subulate-pointed; corolla 8–15 mm long, covered outside with short white hairs and numerous sessile glands; corolla-tube with a pronounced band of squamiform nectary-hairs; upper lip suberect, enlarged above, emarginate; lower lip with strict elliptical lateral lobes, the middle lobe broadly obovate, deeply concave, emarginate, hairy-margined; stamens concealed under upper corolla-lip; staminodes very small; style slightly exserted; lobes of stigma subequal; nutlets 1.75 mm long, globose, flattened, dark brown, faintly dark-striate, scabrous. May–July.

Grassy slopes, calcareous rocks, conglomerates, slate, scrub and roadsides. — Caucasus: Dag. Endemic. Described from N. Dagestan. Type in Leningrad.

Note. *S. fugax*, a closely allied species from the Kars area, should probably be included in the same series.

Series 4. *Nutantes* Pobed. — Inflorescences nodding; verticillasters more or less crowded; stamens and style exserted about one-third to one-half their length; upper lip of corolla arched, sometimes recurved; flowers violet; floral leaves green, shorter than calyx.

68 *S. nutans* L. Sp. pl. (1753) 27; Georgi, Besch. Russ. R. III, 4, 659; Bess. Enum. pl. 4; Benth. Lab. Gen. et sp. 238; Ldb. Fl. Ross. IV, 629; Benth. in DC. Prodr. XII, 293; Shmal'g. Fl. II, 319; Grossg. Fl. Kavk. III, 323. — *S. hastata* Ettl. Salv. (1777) 48. — *S. acutifolia* Lam. Encycl. meth. VI (1804) 637. — Ic.: Rchb. Ic. fl. Germ. XVIII, tab. 1250; Bot. Mag. tab. 2436. — Exs.: Herb. Fl. Sov. Ukrain. No. 87; GRF, No. 1673.

Perennial, 20–100 cm high; stems 1 or 2, erect, simple, long, leafy, covered with short fine appressed hairs and short-stipitate glands, more densely hairy in inflorescence; leaves all [?] radical, ovate-cordate, (3.8) 8 (16.5) cm long, (1.8) 5.5 (9.5) cm broad,  
 350 obtuse, acuminate or long-acuminate, singly or doubly crenate, glabrous above, with dense short hairs, the petiole longer than blade, dilated at base, covered with spreading multicellular hairs; cauline leaves 1 pair, small, sessile, lanceolate or subulate, very rarely short-petioled; all floral leaves rounded-ovate, abruptly attenuate to a point the length of blade, sessile, entire, covered above with scattered short appressed hairs, beneath and especially at margin with long or short multicellular thick-based hairs; inflorescence





PLATE XVII. 1 – *Salvia amasiaca* Fr. et Bornm.; 2 – *S. intercedens* Pobed.; 3 – *S. plebeja* R. Br. General aspect of the plants and details: flower, fruiting calyx, stamen, lower lip of corolla.

short, strongly branched; branches 3 pairs, bearing crowded 4–6-flowered verticillasters at their nodding ends; calyx 4–5 mm long, covered with short simple hairs on the nerves and short-stipitate glands between them; upper lip of calyx shorter than the lower, rounded, very closely and minutely toothed; lower lip with 2 ovate teeth; all teeth subulate-pointed; corolla bright blue-violet, three times as long as calyx, the tube included in calyx (no nectary-hairs have been observed); upper lip recurved, arched, covered outside with short white hairs and numerous sessile orange glands; lateral lobes of lower lip elliptical, obtuse; middle lobe twice as long, suborbicular; stamens slightly exceeding the corolla; upper stamens staminodial; anther-locules slightly notched; style long, exserted; lobes of stigma unequal; nutlets ellipsoid, 2 mm long, dark brown. May–July.

Steppes, dry valley meadows, limestone outcrops, wood margins, rarely weed-infested places. — European part: V.-Kama, U. Dnp., M. Dnp., V.-Don., Transv., Bes., Bl., Crim., L. Don.; Caucasus: Cisc. Endemic. Described from steppes of the European part of the U.S.S.R. Type in London.

Note. The following hybrids of this species have often been recorded: *S. nutans* L. × *S. pratensis* L. The hybrid *S. nutans* L. × *S. nemorosa* L. has been described by Blotskii as a distinct species *S. podolica* Blocki. The natural occurrence of this hybrid would contradict the view that *S. nutans* does not hybridize with *S. nemorosa*, but no conclusive evidence has been supplied. It may be mentioned that many authorities also consider *S. pendula* Vahl as a product of a cross between *S. nutans* and *S. nemorosa*. In the U.S.S.R., a hybrid derived from these species was described as *S. cernua* Czern. and was recorded by Chernyaev under this name in 353 the herbarium. In our opinion, this hybrid cannot be distinguished from *S. pendula*, although the following characteristics have been suggested: more profusely branched inflorescence, shorter hairs and shorter floral leaves. Our examination of the material concerned does not confirm these differences. Most specimens of “*S. cernua*” do indeed have a larger number of branches, but many specimens do not differ in this character from W. European plants. Large flowers, such as are to be found in *S. pendula*, do not in fact occur in *S. cernua*, but there are small-flowered specimens of *S. pendula*. No differences have been observed in the size of floral leaves; indument and flower structure are also alike. It is difficult to accept the suggestion that *S. pendula* is a hybrid between *S. pratensis* and *S. nemorosa*, since the nodding inflorescences that characterize *S. pendula* do not occur in the parental species. As regards morphological characters, *S. pendula* could rather be considered as a hybrid between *S. nutans* L. (nodding and initially crowded inflorescences) and *S. virgata* L. (long strict branches with distant whorls). The area of the latter species (Crimea, Caucasus) is on the whole far removed from the supposedly hybridogenic *S. pendula* Vahl. *S. cremenescensis* Bess., described from Kremenets, is probably of such hybrid origin.

Examination of flowers shows that calyx in this species is covered with more copious and longer hairs compared with *S. pendula*; we believe therefore that Bentham was mistaken in combining the two in one species. Moreover, Shostenko who examined the authentic specimens, noted that the plant differs from *S. cernua* (which we identify with *S. pendula*) in having larger leaves, green floral leaves, larger calyx,

corolla and nutlets. It has not been possible to ascertain the consistency of *S. cremenescensis* as only a few specimens of this species were collected in Podolia and none have since been found anywhere.

Series 5. *Austriacae* Pobed. — Stamens and style twice to three times as long as upper corolla-lip; upper corolla-lip narrow, nearly straight or slightly incurved; flowers yellow; floral leaves green, as long as or shorter than calyx; inflorescences erect.

69. *S. austriaca* Jacq. Fl. Austr. II (1774) 8; Etl. Salv. No. 41; Willd. Sp. pl. I, 138; Georgi, Besch. Russ. R. III, 4, 659; M. B. Fl. taur.-cauc. I, 21; Roem. et Schult. Syst. veg. I, 247; Benth. Lab. Gen. et sp. 232; Ldb. Fl. Ross. III, 363; Benth. in DC. Prodr. XII, 289; Boiss. Fl. or. IV, 626; Shmal'g. Fl. II, 318. — *Sclarea distans* Moench, Meth. pl. (1794) 375. — Ic.: Jacq. l. c. tab. 212; Rchb. Ic. fl. Germ. tab. 50. — Exs.: Fl. exs. Austro-Hung. No. 2961.

- 354 Perennial, 30–50 cm high; stem erect, simple, covered from base with long fine spreading often thick-based hairs and long-stipitate glands, in inflorescence also with profuse fine multicellular yellowish non-implexed strict hairs; internodes mostly very long; leaves predominantly radical, ovate, elliptical or oblong, (7) 12 (20) cm long, (5.5) 8 (10) cm broad, obtuse or acute, cordate or cuneate at base, erose-dentate, often sublobate especially at base, with a broad flat midvein, glabrous above, covered beneath (mostly sparsely and sometimes only on the veins) with short hairs and with scattered small colorless shining sessile glands, rarely white-tomentose, the petiole shorter than blade; cauline leaves nearly always 1 or 2 pairs, small, elliptical, obtuse, sessile, often deeply incised, sublobate, more densely pubescent beneath, with numerous pale sessile glands; lower floral leaves resembling the cauline but more deeply cut, almost pinnate, covered on both sides, or else lanceolate, crenate-dentate or ovate, gradually acuminate, sessile; floral leaves broad-ovate, acute, small, as long as or shorter than calyx, covered on both sides with long fine multicellular yellowish hairs; inflorescence simple or with one pair of lower branches not reaching the summit of inflorescence; verticillasters more or less approximate, only the lower subdistant, 4–6-flowered; calyx 5–7 mm long, outside with indument as on floral leaves, inside in upper half with short appressed hairs; upper lip of calyx broad, with obsolescent approximate teeth; lower lip with 2 longer ovate teeth, all teeth with a very short point; corolla yellow, 1.5–2.5 cm long, the tube slightly exserted; upper lip falcate, flattened, covered on the back with long-stipitate glands; lower lip with oblong, elongated, erect lateral lobes, the middle lobe broad, conduplicate, emarginate, unevenly and obtusely toothed; staminal connective very long, exserted, nearly twice as long as upper lip; sterile anther-locules with an obtuse rounded upper angle; style long, exserted more than the stamens; lobes of stigma unequal; nutlets obtusely trigonous, subglobose, 1.5 mm in diameter, brown, not reticulate. April–July.

Steppes, meadows, field margins. — European part: U. Dnp., M. Dnp., U. Dns., Bes., Bl., Crim. Gen. distr.: Centr. Eur. Described from Austria. Type in Vienna.



Note. A. A. Grossheim reports this species in "Flora Kavkaza" (Flora of the Caucasus) on the basis of a specimen from Stavropol. However, determination of this  
355 specimen has proved to be incorrect; it should have been referred to *S. armeniaca* (Bordz.) Grossh., yet the occurrence of this species in Stavropol is very doubtful (its distribution area is E. and S. Transcaucasia). There has apparently been a labelling mix-up in this case.

70. *S. armeniaca* (Bordz.) Grossh. in Beih. Bot. Centralbl. XLIV, 2 (1928) 237; Bordz. Adnotat. ad Indicum semin. anno 1929 a Horto botan. Kioviensi editum and in Vestn. Tifl. bot. sada, 5, 44, emend. — *S. staminea* Montb. et Auch. subsp. *armeniaca* Bordz. in Acta Horti Jurjewensis, XIII, 1 (1912) 22. — *S. staminea* Montb. et Auch. var. *albiflora* Fomin in sched. ad herb. Hort. Tifl. — *S. staminea* auct. fl. Cauc. — *S. austriaca* auct. fl. Cauc.

Perennial, 20–60 cm high; stem erect, simple, villous from base with scattered soft-taeniate hairs, these intermixed with short-stipitate glands, in inflorescence with a higher proportion of soft multicellular hairs and also with long-stipitate glands; leaves evenly distributed along the stem; radical leaves oblong-ovate, 5–8.5 cm long, 2.5–3 cm broad, obtuse, cordate, unevenly crenulate, the upper side with fascicles of soft multicellular hairs between the veins, the lower side puberulent on the veins and with scattered small colorless shining sessile glands, rugose, the petiole as long as or shorter than blade; cauline leaves several pairs, the lower short-petioled, the middle and upper sessile, smaller; lower floral leaves suborbicular, attenuate to a short point, subglabrous; upper floral leaves similar but covered with numerous long fine multicellular hairs and few long-stipitate glands, shorter than calyx; inflorescence with 1–2 pairs of lower branches; verticillasters distant, 3–5-flowered; calyx 5–7 mm long, covered outside with fine multicellular hairs intermixed with soft taeniate hairs (much shorter than in *S. austriaca*) and long-stipitate glands, inside in upper part appressed-puberulent; upper lip with short approximate teeth, the middle tooth shorter; lower lip with longer lanceolate teeth; all teeth briefly subulate-pointed; corolla yellow, 1–2 cm long, the tube included; upper lip suberect, narrow, emarginate, covered on the back with very short hairs; lower lip as long as the upper, the lateral lobes oblong, obtuse, the middle lobe transversely oblong, entire, conduplicate; staminal connective very  
356 long, exserted; sterile anther-locules with 2 divergent processes, one cartilaginous, connected with adjoining locule of sterile anther, the other pointing in opposite direction, without cartilaginous rim; style very long, exserted; lobes of stigma rounded; nutlets unknown. June. (Plate XVI, Figure 3.)

Dry slopes in the mountain-steppe zone. — Caucasus: E. and S. Transc. **Gen. distr.:** Arm.-Kurd. (Kars, Artvin), Iran (N.). Described from Mt. Alagez (Aragats), village Kipchak. Type in Tbilisi.

Note. An Iranian vicariad, *S. staminea* Montb. et Auch., differs from both preceding species in having a villous stem.

Series 6. *Verbenacae* Pobed. — Flowers 8–9 mm long, blue; upper lip of corolla falcate; floral leaves green, slightly shorter than calyx; stamens slightly exserted; style much exserted; inflorescences erect; leaves deeply sinuate, unevenly toothed.

71. *S. verbenaca* L. Sp. pl. (1753) 25; M. B. Besch. Land. Casp. 208; C. A. M. Verzeichn. 87; Benth. Lab. Gen. et sp. 239; Ldb. Fl. Ross. III, 367; Benth. in DC. Prodr. XII, 294; Boiss. Fl. or. IV, 629; Shmal'g. Fl. II, 320; Grossg. Fl. Kavk. III, 323. — *S. verbenaca* L.  $\beta$ . *vernalis* auct. fl. Cauc. non Boiss. — *S. spielmanniana* M. B. Fl. taur.-cauc. I (1808) 21. — *S. oblongata* Vahl, Enum. I (1805) 256. — *S. polymorpha* M. B. Fl. taur.-cauc. III (1819) 23. — Ic.: Rechb. Ic. bot. tab. 523 and Pl. crit. VI, tab. 525.

Perennial, 15–50 cm high; stem simple, much longer than inflorescence, rarely of same size, covered from base with long taeniate hairs, these often intermixed in inflorescence with short thick retrorse appressed hairs; leaves mostly in lower part of stem, ovate to oblong-ovate, obtuse, subcordate or rounded at base, deeply sinuate and unevenly dentate, sometimes sublobate, slightly rugose, glabrous on both sides, slightly pubescent on the veins, the midvein strongly dilated at base, the petiole one-and-a-half times as long as the blade; lower and middle cauline leaves slightly smaller, short-petioled; upper cauline leaves (sometimes also the lower and middle) ovate, acute, denticulate, sessile; lower floral leaves broadly lanceolate, deeply toothed, point-tipped; upper floral leaves suborbicular to transversely elliptical, short-pointed, densely covered beneath and especially at margin with fine multicellular hairs, glabrous above, reflexed in fruit; inflorescence simple or with 1 pair, rarely 2 pairs, of lower branches not reaching the summit of inflorescence; verticillasters 4–12, 4–6-flowered; pedicels short, densely covered with fine hairs, arched-recurved in fruit; calyx 6–7 mm long, densely covered (especially at margin) with long fine hairs, rarely with isolated glandular hairs on the tube; corolla blue, one-and-a-half times as long as calyx; upper lip falcate, sparsely puberulent on the back; lower lip with short strict elliptical-oblong lateral lobe, the middle lobe broad, suborbicular, deeply concave, entire; stamens slightly exerted; filaments one-third to one-half the length of connective, the upper arm of connective several times length of the lower, bearing a sterile anther and surmounted by 2 small divergent appendages; style strongly exerted (often as much as the length of upper lip); lobes of stigma unequal; nutlets ellipsoid, obtusely trigonous, 2.25 mm long, dark brown, smooth. April–May.

Meadows, dry slopes, on limestone; also as weed in vineyards. — European part: Crim.: Caucasus: Dag., E. Transc. Gen. distr.: Centr. and Atl. Eur., W. Med. Described from Europe. Type in London.

**Economic importance.** Yields a small amount of agreeably scented essential oil (Nilov and Vil'yams in Zap. Gos. Nikitsk. bot. sada, IX, 1, 1929).

**Note.** It should be mentioned that Caucasian and Crimean specimens of *S. verbenaca* L. differ from the European in calyx and inflorescence rachis being completely eglandular or rarely with isolated glandular hairs; in European plants, otherwise identical with the Caucasian and Crimean, calyx-tube and inflorescence axis are mostly covered with long-stipitate glands.

This species often appears in the herbarium under the appellation *S. verbenaca*  $\beta$ . *vernalis* Boiss., but this is quite wrong. The Crimean and Caucasian *S. verbenacea* may perhaps recall  $\beta$ . *vernalis* Boiss. in early flowering (April–May) but does not show any resemblance in other characters. According to Boissier,  $\beta$ . *vernalis* is a low plant with a leafless stem, almost pinnate leaves, and large flowers twice as long as calyx; none of these features are to be found in the Caucasian or Crimean *S. verbenaca*.

Subgenus 5. **Jungia** (Moench) Briq. in Pflanzenfam. IV, 3a, 3b (1897) 277. — *Jungia* (gen.) Moench, Meth. pl. (1794) 378. — *Calosphace* (sect.) Benth. in Hook. Bot. Misc. 3 (1833) 375 et Lab. Gen. et sp. (1833) 245. — Calyx ovoid-tubular or  
358 campanulate, the upper lip entire or briefly 3-toothed; corolla-tube exserted or included in calyx, without a ring of hairs but sometimes with 2 raised teeth at base; upper lip erect, curved, entire or often shallowly emarginate; lobes of lower lip spreading; staminal connective at length recurved, linear, longitudinally connate; lower lobe of style subulate; American herbs and subshrubs, polymorphic in habit and subdivided into a large number of sections; leaves simple, serrate or rarely entire.

72. *S. splendens* Ker.-Gawl. in Bot. Reg. VII (1822) tab. 687; Sellow ex Nees in Neuwild, Reise Bras. II, 335.

A branched subshrub, with glabrous stems; leaves ovate or elliptical, (5.5) 10.5 (12.5) cm long, (2.5) 5.5 (6) cm broad, long-acuminate, cuneate or rounded at base, serrate, glabrous on both sides, the petiole much shorter than blade, the leaves becoming progressively smaller and petioles shorter toward summit; floral leaves elliptical-oblong or lanceolate, red, long-acuminate, short-petioled or sessile, ciliate, soon deciduous, with white multicellular hairs, these with a red stripe at juncture of the broad flat segments; inflorescence simple, at ends of stems and branches; verticillasters 7–10, spaced 1.5–2 cm apart, 2–4-flowered; pedicels 6–8 mm long, densely covered with reddish hairs; calyx campanulate, 15–20 mm long, red, covered on the nerves with very short or long multicellular hairs (these red-striped between the segments), falling off in maturity; upper lip of calyx about as long as the lower, entire, acute; lower lip bidentate, the teeth ovate, subulately short-pointed; corolla 5–6 cm long, scarlet, the tube very long, exserted, puberulent outside, inside at base with 2 nectary-scales, 3–3½ times as long as calyx; upper lip straight, slightly longer than the lower, truncate at apex; lower lip with spreading lateral lobes, the middle lobe strict, rather deeply concave; stamens concealed under upper lip or slightly exserted, shorter than the connective and attached to it at an angle, the anterior arm longer than the posterior, slightly enlarged at the end, free, not united with the adjoining; differentiated sterile anther-locule absent; style prominently exserted; lobes of stigma subequal; nutlets oblong, 3–3.5 mm long, with 3 short obtuse lobes at apex, yellow, finely brown-tuberculate. May–June.

A Brazilian species, widely cultivated in the U.S.S.R.; no naturalized plants have  
359 been observed. Another American species, *S. lancifolia* Poir. was reported as an escape near Khar'kov (Fedchenko in Izv. Gl. bot. sada, 1928, 93) and has been mentioned as a weed (Vizn. rosl. URSR, 1950, 422).

**Economic importance.** This subshrub has long been widely cultivated in Europe and Asia for the sake of its beautiful scarlet flowers and floral leaves. In the U.S.S.R. it has been a favorite garden plant for a long time. Low-growing and early-flowering varieties have been produced, such as Triumph, Zurich, Zurich Dwarf, Fireball, etc. Varieties with white flowers (Bavaria) and purple-violet flowers (Galicia) are also available (Vol'f in Progress sadovod. i ogorodn., 1911, 1355–1356).



Subgenus 6. *Covola* Medik. Phil. Bot. II (1791) 67. — Hemisphace (gen.) Benth. in Hook. Bot. Misc. 3 (1833) 374. — *Covola* (gen.) Briq. in Pflanzenfam. IV, 3a, 3b (1897) 286. — Hemisphace (sect.) Benth. Lab. Gen. et sp. (1832–1836) 310. — Calyx tubular, not altered after flowering, reflexed in maturity, persistent; corolla-tube with a ring of hairs inside, this arcuately raised opposite the upper lip; verticillasters many-flowered; upper lip of calyx erect, arched, spreading, abruptly narrowing at base; lateral lobes of lower corolla-lip much smaller than the biparted middle lobe; filaments about as long as or longer than the connective which forms their extension; sterile anther locules absent; lower arm of connective very short, subulate, directed downward along the filament; disk under the nutlets conical, with a broad lobed margin in maturity. Herbaceous plants with large simple or lobate leaves.

73. *S. verticillata* L. Sp. pl. (1753) 37; Benth. Lab. Gen. et sp. 311; Ldb. Fl. Ross. III, 368; DC. Prodr. XII, 357; Boiss. Fl. or. IV, 634; Shmal'g. Fl. II, 321; Grossg. Fl. Kavk. III, 316; Kryl. Fl. Zap. Sib. IX, 2372. — *Horminum verticillatum* Mill. Gard. dict. VIII (1768) No. 3. — *Salvia mollis* Don, Hort. Cant. ed. 1804, non Jacq. — *S. regeliana* Trautv. Ind. sem. hort. Petrop. (1866) 93. — Ic.: Hegi, III. Fl. 2504; Rchb. Ic. fl. Germ. XVIII, tab. 1255. — Exs.: Fl. exs. Reip. Boh.-Slov. No. 61; Pl. Hercegov. 218; Fl. stir. No. 1038; Fl. siles. No. 921; Fl. Gall. et Germ. No. 20; Eston. pl. No. 128.

Perennial; rhizome 5–10 mm thick, brown, subhorizontal or ascending; stems several, simple, rarely branched, erect, 30–80 cm long, rather densely covered with taeniate hairs, these shorter in inflorescence; leaves cordate-ovate, (4) 9 (13) cm long, (3) 5 (10) cm broad, acute, with 1 or 2 pairs of small opposite decurrent segments, rarely without such segments, coarsely crenate, prominently veined beneath, with strict taeniate hairs, these scattered all over the surface, more numerous beneath or copious on both sides; lower leaves with petiole as long as or longer than blade, the upper short-petioled or sessile; inflorescences simple or more often with 1–2 pairs of long branches not reaching the summit of inflorescence; verticillasters 20–40-flowered, approximate at ends of branches, the lower distant; pedicels as long as or shorter than flower, densely covered with short strict antrorse hairs; calyx tubular, covered on the ribs with strict white hairs, often lilac; upper calyx-lip with acute teeth 0.5–1 mm long (the middle tooth sometimes shorter than lateral teeth) spreading and concave in fruit; lower lip with 2 oblong acuminate teeth 1.5–2 mm long; corolla violet, twice as long as calyx, covered outside with short thick papilliform hairs; upper lip emarginate, arched; middle lobe of lower lip deeply cut into 2 square lobules, the lateral lobes half the length of the middle lobe; style exserted; lobes of stigma subequal; nutlets rounded-ellipsoid, light brown, smooth, 1.5–2 mm long. May–September.

Stony taluses, pine woods, dry heights, stony and clayey soil, often a weed. — European part: Kar.-Lap., Lad.-Ilm., Balt., U. V., V.-Kama, M. Dnp., V.-Don, Transv., U. Dns., Bes., Bl., Crim., L. Don; Caucasus: throughout; W. Siberia: Alt.; Centr. Asia: Ar.-Casp. Gen. distr.: Centr. and Atl. Eur., W. and E. Med., Bal.-As. Min., Arm.-Kurd. Described from Austria. Type in London.

Note. A highly polymorphic species, varying in dentation of the leaf margin; leaves range from subglabrous to densely hairy, almost tomentose, with a velutinous coat of soft hairs on both sides.

Forms with very hairy leaves and small flowers occur mostly in Crimea and in the Caucasus, more rarely in the Mediterranean region, in Baltic states, etc. Benthams designated such forms as *β. mollis*, and the sparsely hairy forms as *γ. pallida*. The number of subsidiary leaf segments (1 or 2 pairs) also varies considerably.

361 Trautvetter (op. cit.) described the species *S. regeliana* from cultivated specimens that had been grown from seeds supplied from Borzhomi Radde. The specimen used by Trautvetter as type has not been preserved. The only specimens available are those collected by Regel in the Petersburg Botanical Garden and those originating from other botanical gardens. The main characters distinguishing this species from *S. verticillata* persist in herbarium specimens; they all have simple leaves without subsidiary segments and depauperate inflorescences with 3–11 flowers. Specimens with similar leaves or (more rarely) with few-flowered inflorescences, occur in *S. verticillata* but both features are not to be found on the same plant. The occurrence of this species in Borzhomi has not been confirmed since the description, we therefore doubt its existence in the field.

There is a striking specimen, collected in the Urup and Laba river basins (station Spokoinaya-Upornaya) which differs markedly from *S. verticillata* in having pedicels 2–3 times the length of flower. Such conspicuous difference would warrant segregation at species level, but this can hardly be done as the herbarium specimen in question has retained only one leaf.

**Economic importance.** The herbage contains 0.05–0.08% essential oil with a very agreeable scent (Grossgeim, Isaev, Karyagin and Rza-Zade, *Lekarstvennye rasteniya Azerbaidzhana*, 1942).

74. *S. amasiaca* Fr. et Bornm. in Oest. Bot. Zeitschr. XII (1891) 58; Grossg. Oprod. rast. Kavk., 340.

Perennial; rhizome long, slender, brown; stems several, simple or branched, with evenly distributed leaves, covered with short thick-based hairs intermixed with short-stipitate and sessile orange glands, in inflorescence more densely glandular; leaves thickish, ovate, 4.5–6 cm long, 2–2.6 cm broad, obtuse, rounded or subcordate at base, without subsidiary segments, rarely with minute segments, slightly obtuse-dentate or crenate, the lower large, with petiole as long as blade, the middle small, acute, short-petioled, the upper sessile, all prominently veined beneath, covered above and on the veins beneath with scattered short thick hairs, on both sides with sessile orange gland; inflorescence simple at ends of stems and branches or with one pair of branches at base, composed of 5–6 verticillasters of 15–25 flowers; pedicels as long as or slightly shorter than calyx, densely covered with short thickened appressed antrorse hairs and short-stipitate glands; calyx 6–7 mm long, prominently ribbed, covered on the ribs with short thickened hairs and between them with short-stipitate glands; upper lip of calyx with 3 short approximate teeth, reflexed and concave in fruit; lower lip 362 longer than the upper, with 2 somewhat longer teeth, all teeth subulately short-acuminate; corolla violet, 2–2½ times as long as calyx, densely covered outside with short

thick papilliform white hairs, the tube prominently exserted; upper lip elliptical, arched, emarginate; middle lobe of lower lip consisting of 2 square lobules; anthers concealed under upper lip or slightly exserted; style about equaling the stamens; stigma with 2 subequal lobes; nutlets trigonous-ellipsoid, 2 mm long, light brown. August–September. (Plate XVII, Figure 1.)

Thin woods on stony slopes, at altitudes between 1500 and 1800 m. — Caucasus: S. Transc. Endemic. Described from Daralagez (village Chaikent). Type in Leningrad.

Subgenus 7. *Sanglakia* Pobed. subgen. n. in Addenda XX, 663. — Calyx tubular, not altered after flowering, readily falling off in maturity; tube of corolla with a regular (not arched) ring of hairs; inflorescence racemiform, loose; flowers solitary in the leaf axils, with a pair of bracts; upper lip of corolla deeply 2-lobed; lower lip 3-lobed, the lateral lobes about as long as the middle lobe, slightly spreading, almost strict; filaments about as long as or longer than the connective; connective forming an extension of filaments; sterile anther-locules absent; lower arm of connective very short, subulate, directed downward along the filament; disk hemispherical, with ligulate processes between the nutlets. Low subshrubs, densely hairy, with very small simple leaves.

Note. We are inclined to consider this subgenus as a distinct genus, but we propose to postpone reclassification until a thorough revision of the species concerned has been completed.

75. *S. baldshuanica* Lipsky in Tr. Bot. sada, XVIII, 1 (1900) 90; B.A. Fedch. Rast. Turk. 680; Kudr. Mat. k izuch. shalf. Sr. Az. 32.

363 Low subshrubs, 8–30 cm high, with a thick woody dark-brown root and dark brown slender branched stems; anntinous flowering branches green, densely covered with short patent hairs; leaves ovate or elliptical, 8–12 mm long, 5–7 mm broad, obtuse or subacute, cuneate at base, decurrent, flexuous-hairy at margin, curly, doubly dentate, strongly rugose on both sides, gray with numerous short spreading hairs, the petiole as long as or shorter than blade; upper leaves subsessile; floral leaves ovate, acute, 4–5 mm long, 2 mm broad, sessile, with dense long hairs; inflorescences simple, racemiform, as long as or longer than stems; pedicels long-hairy, 3–6.5 mm long, with 2 narrowly oblong long-haired bracts; calyx campanulate, long-haired outside, with short appressed hairs inside; upper lip rounded, with 3 small approximate teeth at apex, the middle tooth somewhat shorter than the lateral; lower lip bilabiate, with longer teeth; all teeth subulately short-pointed; corolla twice as long as calyx, the tube slightly exserted, the hairy ring forming a regular circle; upper lip short, with obtuse elliptical lobes; filaments long, exserted, the whole connective included; upper stamens staminodial; nutlets ellipsoid, 1.5 mm long, black, smooth, with oblong areola. June–July. (Plate XVIII, Figure 2.)

Gypsiferous rocks. — Centr. Asia: Pam.-Al. (only in the Sanglak range near Bal'd-zhuan). Endemic. Described from the Sanglak range. Type in Leningrad.



## UNDETERMINED SPECIES

*S. ruthenica* Weinm. in Bull. Soc. Nat. Mosc. VII (1837) 55.

*S. erosa* Andrz. in Rogovich, Obozr. semenn. i vyssh. spor. rast. gub. Kievsk. uch. okr. (1869) 304.

*S. phlyctidea* C. Koch in Linnaea, XXI (1848) 655.

### Genus 1286.\* *Schraderia*\*\* Medik.

Medik. Phil. Bot. II (1791) 40; Moench, Meth. pl. 378. — *Schraderia* (subgen.) Briq. in Pflanzenfam. IV, 3a, 3b (1897) 271. — *Hymenosphace* (sect.) Benth. in Hook. Bot. Misc. 3 (1833) 373 et Lab. Gen. et sp. (1833) 214

Calyx broadly campanulate, always colored, membranous; upper calyx-lip entire or rarely 3-toothed, with an obtuse middle tooth and minute triangular subulate-pointed lateral teeth; fruiting calyx with dilated tube, the lips spreading, the lobes strongly accrescent; corolla-tube with a ring of hairs inside; upper lip of corolla slightly falcate or straight, as long as or shorter than lower lip; lower lip 3-lobed, the middle lobe broad, convex, pendent, emarginate, the lateral lobes spreading; filaments long, equaling or exceeding the connective; connective arched-recurved, with subequal arms; both anther-  
364 locules fertile, rarely (section *Odontochilus*) the anterior locules sterile, sometimes well developed staminodes (*S. actabulosa* (Vahl.) Pobed.); nutlets subglobose. Shrubs or subshrubs, rarely herbs, with pinnatisect, rarely simple leaves.

The genus contains about 14 species, mainly distributed in the Near East, S. and N. Africa, Greece, Caucasus and Centr. Asia. Four species occur in the U.S.S.R. The type species is *S. africana* (L.) Medik.

1. Calyx and corolla pink to pale or dark purple; anterior anther-locules united; floral leaves persistent . . . . . 2.
- + Calyx and corolla yellow; anterior anther-locules free; floral leaves caducous . . . . . 4. *S. korolkovii* (Rgl. et Schmalh.) Pobed.
2. Stems several, simple; leaves simple, nearly all radical, whitish-hairy beneath; verticillasters distant . . . . . 3. *S. acetabulosa* (Vahl) Pobed.
- + Stems branched; leaves pinnatipartite, distributed along the stem, less hairy; verticillasters approximate . . . . . 3.
3. Corolla-tube long, greatly exceeding the calyx; leaves large, the terminal segments 3–6 cm long, 1.5–2.5 cm broad (Centr. Asia) . . . . . 1. *S. bucharica* (M. Pop.) Nevski.
- + Corolla-tube short, scarcely exserted; leaves small, the terminal segments 1–3 cm long, 0.5–1.2 cm broad . . . . . 2. *S. dracocephaloides* (Boiss.) Pobed.

\* Treatment by E. G. Pobedimova.

\*\* Named for Adolf Schrader, professor of medicine and botany in Göttingen (1761–1836).



PLATE XVIII. 1 – *Schraderia acetabulosa* (Vahl) Pobed.; 2 – *Salvia baldshuanica* Lipsky.; 3 – *Schraderia bucharica* (M. Pop.) Nevski. General aspect and details: flower, fruiting calyx, stamen, lower lip of corolla, receptacle with immature nutlets, staminode.

Section 1. *Holochilus* Pobed. sect. n. in Addenda XX, 663. — Upper lip of calyx entire; floral leaves persistent; anterior anther-locules fertile, united.

Series 1. *Bucharcae* Pobed. — Stems branched; leaves pinnate, distributed along the stem; verticillasters more or less approximate; staminodes none.

1. *S. bucharica* (M. Pop.) Nevski in Tr. Bot. inst. AN SSSR, 1, 4 (1937) 327. — *Salvia bucharica* M. Pop. in Tr. Turk. nauchn. obsch. I (1923) 46; Kudr. in Tr. sekt. rast. resurs. Komit. nauk, 3, 11. — *S. hydrangea* auct. fl. Turkest. (nec DC.). — *S. schiellii* auct. fl. Turkest. (nec Boiss.).

Subshrub; root thick woody, dark brown; caudex cinereous; stems 30–50 cm long, light brown or yellow, branched, glabrous; branches covered with numerous very short hairs and scattered long hairs, in inflorescence with short upcurved hairs; leaves evenly distributed along the stem and branches; lower and middle leaves pinnatipartite, the terminal segments 3–6 cm long, 1.5–2.5 cm broad, elliptical, short-petioled, the lateral segments 2 pairs, smaller, subsessile, oblong-elliptical, undivided, rarely bipartite, all segments acute, cuneate or rounded at base, obtusely denticulate, subglabrous above, with scattered short thick-based hairs, more densely covered beneath with very short hairs, both sides covered with sessile glands, the lower side more densely so; upper leaves usually with one pair of lateral segments; lower floral leaves with very small lateral segments; upper and middle floral leaves ovate, sessile, clasping, acute, entire, green, densely covered beneath with short upcurved hairs, with scattered hairs above; inflorescences unbranched, at ends of stems and branches, with 3–6 verticillasters, these (2) 5 (8)-flowered, 2–4 cm apart; calyx membranous, bright pink, prominently netted-nerved, puberulent; upper lip of calyx entire, semiorbicular; lower lip deeply 2-lobed, with obtuse mucronulate lobes; corolla pink, 3–3.3 cm long, 2½ times as long as calyx, covered outside with few hairs and sessile glands, the tube long-exserted; upper lip of corolla slightly curved to almost straight, slightly shorter than the lower, deeply emarginate; lateral lobes of lower lip half-rounded, spreading; middle lobe broad, infundibular, emarginate, undulate-margined; stamens concealed under upper lip; filaments slightly enlarged at juncture with connective; style slightly exserted; lobes of stigma subequal; nutlets subglobose, 3–4 mm long, 2.5–3 mm broad, smooth, dark brown. May–June. (Plate XVIII, Figure 3.)

Stony slopes in the middle mountain zone. — Centr. Asia: Pam.-Al. Endemic. Described from the vicinity of Samakh (Yakkobag). Type in Leningrad.

- Note. This species has been confounded with two related Iranian species, *S. hydrangea* (Benth.) Pobed. and *S. schiellii* (Boiss.) Pobed. It is distinguishable from them by mucronate lobes of the lower calyx-lip, sparser indument and larger leaf segments.
- 368 It also differs from *S. schiellii* in leaves having fewer pairs of segments (1–3 as against 3–4) and corolla being 2½ times (not 1½ times) as long as calyx.

**Economic importance.** Upon distillation the plant yields 0.25% essential oil. The oil is pale yellow with a greenish tint and its scent is reminiscent of ladanum; it could be of value in the perfume industry. There is need for a study of this plant and suitable cultivation methods (Kudryashev, Dikorast. efirno-maslichn. rast. central'n. chasti Gissarsk. khrebta, 1932, 50).



2. *S. dracocephaloides* (Boiss.) Pobed. comb. n. — *Salvia dracocephaloides* Boiss. Diagn. ser. I, 5 (1844) 4; Benth. in DC. Prodr. XII, 270; Boiss. et Buhse in Nov. Mem. Soc. Nat. Mosc. (1860) 171; Bge. Lab. pers. 41; Trautv. in Tr. SPb bot. sada, II, 2, 576 and IX, 1, 93; Boiss. Fl. or. IV, 606; Grossg. Fl. Kavk. III, 317. — Exs.: Herb. Fl. Cauc. No. 236.

Subshrub, 20–50 cm high; caudex dark brown; stem yellow or grayish, branches glabrous; inflorescence axis and branches covered with short arched antrorse hairs; leaves green, pinnatipartite, with 2 or rarely 3 pairs of segments, the terminal segment elliptical, 1–3 cm long, 0.5–1.2 cm broad, always larger than the lateral segments, all segments short-petioluled, decurrent, the lower side more densely covered with short appressed arched antrorse hairs intermixed with straight hairs, the upper side with scattered hairs, the midvein somewhat prominent; floral leaves simple, ovate, as long as or shorter than calyx, densely covered with mostly antrorse curved hairs; bracts lanceolate, 6 mm long, with indument as on calyx, sometimes absent; inflorescence simple, with 3–5 4–6-flowered verticillasters; calyx densely covered with long fine strict and very short appressed hairs; upper lip of calyx slightly recurved, entire; lower lip with 2 elliptical obtuse short-acuminate lobes; corolla twice as long as calyx, light purple, rarely white (f. *albiflora* Grossh.); calyx-lips pubescent outside; corolla-tube short, scarcely exerted; upper lip of corolla shorter than the lower, almost straight, deeply emarginate; middle lobe of lower lip broad, deeply notched at apex; lateral lobes broad, elliptical, spreading; filaments not enlarged at the end; upper arm of connective longer than the lower; anthers and stigma bright red; style exerted; lobes of stigma very unequal; nutlets subglobose, 3 mm in diameter, brown, rough. May–July. (Plate XIX, Figure 2.)

Dry stony and gravelly-stony slopes, rocks. — Caucasus: S. Transc. (Yerevan, Na-369 khichevan). **Gen. distr.:** Arm.-Kurd. (Kars). Described from N. W. Iran (Sud-Kad'i, near the Khoi range). Type in Geneva; cotype in Leningrad.

**Note.** In the Caucasus, this species replaces *S. bucharica* (M. Pop.) Nevski.

**Economic importance.** The plant contains camphor.

Series 2. *Acetabulosae* Pobed. — Stems several, simple; leaves simple, predominantly radical; verticillasters distant; staminodes well developed. Beside the species described, this series also contains *S. moluccella* Benth.

3. *S. acetabulosa* (Vahl) Pobed. comb. n. — *Salvia acetabulosa* Vahl, Enum. I (1805) 227; Benth. Lab. Gen. et sp. 214 et in DC. Prodr. XII, 271; Boiss. Fl. or. IV, 608; Grossg. Fl. Kavk. III, 317. — *S. acetabulosa* Vahl  $\beta$ . *simplicifolia* Boiss. l. c. — *S. szovitziana* Bge. Lab. pers. (1873) 43. — *S. acetabulosa* var. *szovitziana* (Bge.) Bornm. in herb. — Exs.: Herb. Fl. Cauc. No. 235.

Perennial; roots vertical, woody; rhizome long, slender, woody; stems 1–4, 15–35 cm long, simple, covered with scattered short spreading fascicled hairs, in inflorescence also with scattered straight hairs and few long-stipitate glands; leaves predominantly radical, elliptical or oblong, (2) 2.5 (3) cm long, (1.2) 1.5 (2) cm broad,

obtuse, rounded or subcordate at base, strongly rugose, densely covered on both sides with short fascicled hairs intermixed with longer straight hairs, whitish beneath, greenish above, the petiole 3–5 cm long; lower floral leaves lanceolate, sessile, rarely with petiole length of blade; upper floral leaves broad-ovate, acutish, submembranous, often violet-tinged, shorter than calyx, covered on both sides with short appressed hairs; bracts lanceolate, 6 mm long, equaling the pedicels, partly absent; inflorescences simple; verticillasters 3–5, distant, 4–8-flowered, the terminal often sterile; calyx hispid below, the lobes covered with short- and long-stipitate glands; upper lip of calyx entire; lower lip with 2 obtuse mucronate violet-margined lobes; corolla pink, one-and-a-half times as long as calyx; upper lip of corolla nearly straight, emarginate; lower lip longer than the upper, broad, the lateral lobes elliptical, obtuse, the middle lobe large, broad, emarginate; corolla-tube short, included in calyx; filaments slightly enlarged at base and at summit; connective shorter than the posterior anther, the arms subequal; 370 upper stamens transformed into well developed staminodes, the connective showing incipient elongation and sometimes polliniferous; style exserted; lobes of stigma subequal; nutlets globose, 2–2.5 mm in diameter, light brown with darker reticulation. June–July. (Plate XVIII, Figure 1.)

Dry stony slopes. Not found in the U.S.S.R. but distributed on the adjoining Surmalin range and Kars upland. **Gen. distr.:** Bal.-As. Min., E. Med. Described from the East. Type in Copenhagen.

**Note.** The original description indicates that simple leaves occur in this species. Confirmation to this effect is provided by specimens from the East that we have examined. No pinnate leaves are to be found in plants from areas bordering on the U.S.S.R. A difference in indument has also been observed between specimens from the Kars upland and the Iranian: leaves of the Kars upland plants are covered mainly with fascicled hairs interspersed with sparser straight hairs, whereas specimens from Iran, Asia Minor and Syria have longer simple hairs and sparser fascicled hairs. The calyx of Kars plants is covered with scattered long hairs and with glandular hairs of varying length; the calyx in plants from Iran, Asia Minor and Syria, on the other hand, is eglandular or with isolated glandular hairs.

As regards *S. szovitziana* Bge., described from Elburs and ranked by Bornmüller as a variety, the material that we have examined shows that the characters distinguishing this species from *S. actabulosa* (stems glabrous in inflorescence and hairs confined to nodes, more distant verticillasters and smaller calyx) have not been confirmed by the few specimens from N. Iran or by specimens from the Kars upland and from Asia Minor. Bornmüller was therefore right in refusing to award specific rank to *S. szovitziana*. On the other hand, *S. moluccella* Benth. is readily distinguishable from *S. actabulosa* by its narrower calyx and the much longer, exserted, more hispid corolla-tube; it is therefore impossible to agree with Boissier who considers *S. moluccella* as synonymous with *S. actabulosa*.

**Section 2. *Odontochilus* Pobed. in Addenda XX, 663.** — Upper lip of calyx briefly 3-toothed, the middle tooth prominent, obtuse, the lateral teeth short, triangular, short-acuminate; floral leaves soon deciduous; anterior anther-locules sterile.



PLATE XIX. 1 – *Schraderia korolkovii* (Rgl. et Schmalh.) Pobed.; 2 – *S. dracocephaloides* (Boiss.) Pobed. General aspect and details: flower, fruiting calyx, stamen, lower lip of corolla, stigma, nutlet, receptacle with immature nutlets.



373 4. *S. korolkovii* (Rgl. et Schmalh.) Pobed. comb. n. — *Salvia korolkovii* Rgl. et Schmalh. in Tr. SPb. bot. sada, VI (1879) 356; Fedch. Perech. rast. Turk. V, 133; Kudr. Mat. k izuch. shalf. Sr. Az. 12.

Subshrub; root long, vertical, woody, dark brown; caudex to 10 cm long; stems several from the root, 30–50 cm long, simple or rarely sparingly branched, glabrous also in inflorescence, sparsely tomentose at nodes; leaves predominantly radical; cauline leaves 2–3 pairs, elliptical-oblong, acute, cuneate or almost rounded at base, (8.5) 9 (11) cm long, (2) 3 (4) cm broad, with rounded-denticulate margin, prominently netted-veined, rugose, the upper side green, glabrous or nearly so, the lower side white-tomentose especially in young leaves, the petiole as long as or longer than blade; upper cauline leaves short-petioled or sessile, narrower and smaller, finely arachnoid beneath; floral leaves apparently soon deciduous, lacking in flowering and fruiting specimens; inflorescence sparingly branched, usually with one pair of short lower branches; verticillasters 2–10-flowered, 1–3 cm apart; pedicels 10–12 mm long, persistent after falling of fruit, covered with short fine crisp hairs intermixed with short-stipitate and numerous (especially under the flower) sessile glands; calyx scarious, prominently 13-nerved, covered on the nerves outside (especially the tube) with short fine hairs and scattered sessile glands, inside in upper part with scattered hairs; upper calyx-lip 3-toothed, with a large middle tooth; lower lip with 2 ovate short-acuminate teeth; fruiting calyx with sparser indument; corolla yellow, the tube included in calyx; upper lip of corolla about as long as or shorter than lower lip, straight, pubescent outside, emarginate; lower lip with recurved lateral lobes, the middle lobe convex, broadly obovate, pendent, entire; posterior arm of connective shorter than the linear posterior anther, the anterior arm shorter, gradually passing into a sterile suborbicular anterior anther-locule; style concealed under the upper lip or scarcely exerted; lobes of stigma unequal; nutlets 3.5–4 mm in diameter, globose, dark brown, finely tuberculate. May–July. (Plate XIX, Figure 1.)

Stony slopes in the middle mountain zone, in the mountain steppe belt. — Centr. Asia: T. Sh. Endemic. Described from W. Tien Shan (Mt. KhodzhiKent). Type in Leningrad.

**Economic importance.** This species can be of value for production of essential oil and tar (up to 13.5%). The tar contains 15% acid, 9% phenols and 42.5% neutral components. Samples of varnishes on alcohol, turpentine benzole basis, produced upon  
374 drying a shiny non-peeling film of pale green color (Tsukervanik and Grachev in Tr. Inst. khimii AN UzSSR, 1, 1948).

Tribe 5. MERIANDREAE Endl. Gen. (1838) 613; Briq. in Pflanzenfam. IV, 3a (1895) 208 et 287. — Calyx bilabiate of the  $3/2$  type; corolla small, with somewhat unequal lobes; only lower stamens functional; upper stamens transformed into staminodes or absent; anther-locules parallel, suspended from a small or dilated connective; herbs and subshrubs in U.S.S.R.

Karel. in Bull. Soc. Nat. Mosc. XIV (1841) 15; Kudryashev, Rod *Perovskia* (The Genus *Perovskia*) 1936, 6

Flowers numerous, sessile or short-pedicelled; verticillasters distant, forming a paniculate inflorescence; calyx tubular-campanulate, more or less enlarged in fruit, densely covered with multicellular simple or sometimes branched hairs and numerous round golden sessile glands; upper lip entire or obscurely 3-toothed; lower lip 2-toothed; corolla violet, pink, pale yellow or (rarely) white, twice as long as calyx, the tube infundibular, with an incomplete ring of hairs; limb bilabiate, spreading; upper lip unequally 4-lobed, the middle lobes smaller than the lateral; lower lip undivided, elliptical-ovate; stamens 4, the 2 upper fertile, nearly included in corolla or exerted, attached to upper lip at the base of lobes; anthers bilocular, the locules linear, parallel, strict, the connective small; disk annular or anteriorly enlarged into a gland; style included or exerted; stigma 2-parted, the lobes broad, flat, mostly unequal, pointed; nutlets obovoid, obtuse, attached at base to the disk, 1.5–2.5 mm long, 1 mm broad, fuscous or brown, smooth. Subshrubs with opposite undivided or sometimes pinnatisect leaves, glabrous or covered with simple and branched or only branched multicellular hairs and numerous round golden sessile glands.

The genus contains 7 species distributed in Central Asia, N. Iran, Beluchistan, Afghanistan, W. Tibet and W. India.

- 375 1. Leaves bipinnatisect . . . . . 1. *P. abrotanoides* Kar.  
 + 2. Leaves undivided, oblong, lanceolate, rhombic-lanceolate or ovate . . . . . 2.  
 2. Pedicels 2 mm long; verticillasters 2–4-flowered; calyx covered with branched hairs . . . . . 6. *P. linczevskii* Kudr.  
 + Flowers sessile or pedicels 0.5–1 mm long; verticillasters 2–4–6 (8)-flowered; calyx covered with simple and branched hairs . . . . . 3.  
 3. Leaves 1.5–3 (4) cm long, 0.5–0.8 cm broad, rhombic-lanceolate, sparsely covered with short simple and branched hairs; pedicels 0.5–0.7 mm long; inflorescence virgate; calyx 5 mm long, 1.3–1.5 (2) mm broad . . . . . 5. *P. virgata* Kudr.  
 + Leaves 3–7 cm long, 0.7–3.5 cm broad, oblong, lanceolate or ovate, glabrous; inflorescence pyramidal; pedicels 1 mm long; calyx (5) 6–8 mm long . . . . . 4.  
 4. Leaves oblong, 3–6 cm long, 0.7–2.5 cm broad; inflorescence 11–18 cm long, short-branched, dense; calyx green, covered with simple and branched hairs, the lower lip with rounded teeth; corolla pale-yellow . . . . .  
 . . . . . 2. *P. kudrjashevii* Gorschk. et Pjat.  
 + Leaves broadly lanceolate or ovate; inflorescence (17) 22–30 cm long, branched, lax; calyx more or less colored, violet, rarely green, covered with simple hairs, the lower lip with acute teeth; corolla violet, sometimes white . . . . . 5.  
 5. Leaves ovate or oblong-ovate, 4–7 cm long, 1.4–3.5 cm broad, obtuse, crenate, rounded or cordate at base, the petiole 0.5–1 cm long; inflorescence leafless, to 25–30 cm long . . . . . 3. *P. scrophulariifolia* Bge.

\* Treatment by S. G. Gorshkova.

\*\* Named for the Turkestani statesman B. A. Perovskii.

- + Leaves oblong-lanceolate or broadly lanceolate, 2.5–6 (7) cm long, 0.8–3 cm broad, subacute, serrate, cuneate at base, the petiole 0.4–0.6 cm long; inflorescence leafy, to 22 (30) cm long . . . . . 4. *P. angustifolia* Kudr.

Section 1. *Euperovskia* Kudr. Rod *Perovskia* (1936) 10. — Leaves pinnatisect.

1. *P. abrotanoides* Kar. in Bull. Soc. Nat. Mosc. XIV (1841) 15; Ldb. Fl. Ross. III, 1, 357; Benth. in DC. Prodr. XII, 261; Boiss. Fl. or. IV, 589; O. and B. Fedch. Perech. rast. Turk. V, 132; Fedch. Rast. Turk. 682; Kudr. Rod *Perovskia*, 40. — *P. artemisioides* Boiss. Diagn. II, 4 (1859) 15 et Fl. or. IV, 589. — Ic.: Kar. l. c. tab. 1; Kudr. op. cit., Fig. 3–6. — Exs.: HFAM, No. 221.

Subshrub; stem 1 m long, woody at base, sulcate, 0.5 cm in diameter, densely covered with simple and branched short white multicellular hairs and sparse rounded golden glands; leaves ovate-oblong in outline, 4–7 cm long, 2.5 cm broad, with petiole 5–8 mm long, bipinnatisect, glabrous or sometimes with sparse short hairs, with numerous golden glands, the segments oblong to oblong-linear, obtuse, 2–4 mm long, 0.5–1.4 mm broad; floral leaves 0.8–3 cm long, 0.3–0.8 cm broad; flowers numerous, subsessile or on pedicels 0.5 mm long, horizontal, at length nodding; verticillasters 2–4 (sometimes 6)-flowered, distant, forming a long loose panicle inflorescence 27–40 cm long; bracts lance-linear, acute, 1–1.5 mm long, 0.5 mm broad, one-quarter to one-third length of calyx, hairy; calyx tubular-campanulate, 4–5 mm long, violet, densely covered with simple long white and violet multicellular hairs and glands, sparsely hairy to subglabrous in upper part, briefly bilabiate, the tube 4 mm long, 1.5–2 mm broad, 8-nerved; upper lip entire or obscurely 3-toothed, 1 mm long, 2 mm broad, about as long as the lower lip, this 2-toothed, with densely ciliolate margin; corolla pink, 0.9–1.1 cm long, with sparse short hairs outside; tube exerted, 5–6.5 mm long, 2 mm broad; limb bilabiate; upper lip 4-lobed, 2.5–3 mm long, 6.5–7 mm broad, the lobes ovate to suborbicular, 1.5–2 mm long, 2 mm broad, the middle lobe the smallest; lower lip elliptical-ovate, 3.5 mm long, 2 mm broad, entire, obtuse; stamens 4, of these 2 fertile and 2 sterile, small; style with 2-parted stigma; nutlets obovoid, obtuse, 1.8–2 mm long, 1 mm broad, fuscous, smooth. June–July.

Taluses and stony-gravelly mountain slopes; dry pebble beds and banks of mountain streams and brooks; at the bottom of gullies and rifts and on gravelly plains. Emerging in mountains up to 2000 m. — Centr. Asia: Mtn. Turk., T. Sh. Gen. distr.: Iran. Described from Balkhany Mountains. Type in Leningrad.

**Economic importance.** An ornamental subshrub, undemanding as regards growing conditions; recommended for planting in towns and around dwellings.

Aerial parts harvested at flowering time contain 0.47 to 0.77% essential oil that has practical possibilities (Kudryashev, op. cit. 16). The flowers contain a pigment which imparts reddish or rose tints to fabrics (Tr. Turk. FAN SSSR, V, 98).



2. *P. kudrjaschevii* S. Gorschk. et Pjat. sp. n. in Bot. Mat. gerb. Bot. Inst. AN SSSR XVI (1954).

- 377 Subshrub; stems 0.5–1 m long, mostly branched, sulcate, covered (especially in upper part) with short branched multicellular hairs and round golden sessile glands; leaves glaucescent, oblong, (2.5) 3–6 cm long, 0.7–2.5 cm broad, subacute, rounded-dentate, cuneate at base, covered on both sides with numerous golden glands, prominently veined beneath, the petiole 0.5–0.7 cm long; floral leaves 1 cm long; flowers numerous; pedicels densely pubescent, spreading, at length nodding, 1 mm long; verticillasters rather densely 4–6-flowered, forming a dense short-branched paniculate inflorescence 11–18 cm long; bracts 0.7 mm long, 0.3 mm broad, subacute, pubescent; calyx tubular-campanulate, 5 mm long, green, 8-nerved, densely covered with long white simple and branched multicellular hairs and numerous golden sessile glands, dilated and gradually glabrescent toward throat, briefly bidentate; upper lip obscurely 3-toothed, 0.8–1 mm long, 2–2.5 mm broad; lower lip about equaling the upper, with 2 rounded teeth 0.6 mm long; corolla 1 cm long, pale yellow, sparsely covered with short white simple hairs and glands, the tube 6–7 mm long, 1.5 mm broad, the limb bilabiate; upper lip 4-lobed, 3–5 mm long, the lobes rounded, the middle 1 mm long, 1.6 mm broad, the lateral larger; lower lip obovate, 4 mm long, 2–2.3 mm broad, obtuse, entire; stamens 4, the 2 upper fertile, the 2 lower sterile, included; style exserted or included, with 2-parted stigma; nutlets obovoid, 1.5–2 mm long, 1 mm broad, brown, smooth.

Foothills, on pebbly terraces. — Centr. Asia: T. Sh. (S. Kazakhstan, Bostandyk District). Endemic. Described from the location indicated. Type in Leningrad.

Note. *P. kudrjaschevii* Gorschk. et Pjat. is readily distinguishable from *P. scrophulariifolia* Bge. by its oblong leaves; short-branched, dense inflorescence, 11–18 cm long; green calyx, covered with simple and branched hairs, its lower lip with rounded teeth; pale yellow corolla.

3. *P. scrophulariifolia* Bge. in Mém. sav. étr. Acad. Sc. Pétersb. VII (1854) 433; Boiss. Fl. or. IV, 599; O. and B. Fedch. Perech. rast. Turk. V, 132; Fedch. Rast. Turk. 682; Kudr. Rod *Perovskia*, 17. — Ic.: Kudr., op. cit., Fig. 8, 9, 10. — Exs.: GRF, No. 3100; HFAM, No. 222.

- 378 Subshrub; stems numerous, to 1 m high, erect, sulcate, woody at base, covered with short white branched multicellular hairs and round golden sessile glands; leaves ovate, (3) 4–7 cm long, 1.4–3.5 cm broad, obtuse, crenate, densely glandular on both sides, prominently veined beneath, sometimes puberulent on the veins when young, rounded or cordate at base, the petiole 0.5–1 cm long; floral leaves small, 1.5–2.5 cm long, 0.5–1 cm broad; flowers numerous, subsessile or on pedicel 1 mm long, more or less spreading, at length nodding; verticillasters of 4–6 (8) flowers, distant, forming a leafless pyramidal paniculate inflorescence to 25–30 cm long; bracts 2–2.5 mm long, 0.5 mm broad, lanceolate, acute, mostly deciduous, pubescent; calyx tubular-campanulate, 5–6 (7) mm long, violet, 8-nerved, densely covered (more sparsely in upper part) with long spreading simple whitish-violet multicellular hairs, briefly

bilabiate, glabrate or sparsely ciliate at margin; upper lip obscurely 4-toothed, 1.3 mm long, 2.5–3 mm broad; lower lip 1–1.3 mm long, 2.4 mm broad, with 2 triangular acute teeth 0.5 mm long; corolla violet or white (f. *albiflora* Kudr.), 1.3–1.6 cm long, twice as long as calyx, with tube 8 mm long, 1 mm broad and bilabiate limb; upper lip 4-lobed, 3.5 mm long, 5–6 mm broad, the lobes oblong to suborbicular, the middle 1.5 mm long and as broad, the lateral 2 mm long and as broad; lower lip oblong-obovate, 4–4.5 mm long, 2 mm broad, entire, obtuse; stamens 4, of these 2 fertile, the other 2 sterile, included; anthers 2-locular, blackish; style with 2-parted stigma; nutlets obovoid, 2 mm long, 1 mm broad, brown, smooth. May–July.

Mountains and foothills (up to 1800 m); stony ground, dry pebbles of river beds; steppes (quackgrass and mixed grass with shrubs, needlegrass and quackgrass, needlegrass and fescue) and unirrigated barley fields. — Centr. Asia: Pam.-Al., T.Sh. Endemic. Described from Zeravshan. Type in Paris.

Note. Both *P. scrophulariifolia* and *P. angustifolia* display pronounced heterostyle. Different plants have either exerted stamens or exerted pistils. The plants are cross-pollinated, heterostyly providing an excellent safeguard against autogamy (Kudryashev, op. cit. 21).

The flowers of *P. scrophulariifolia* contain coloring pigments. An aqueous extract of flowers imparts the following colors to silk, depending on the mordant used: 1) "Isabel" with ammonia, 2) pale red or coralline with hydrochloric acid, 3) pink with sulfuric acid, 4) olivaceous with chrome alum, and 5) leaden with a neutral mordant (Tr. Turkm. FAN SSSR, 5, 98).

**Economic importance.** The plant deserves large-scale introduction. In flowering state it contains 0.46% powerfully scented essential oil that could be employed in the 379 perfume and soap industry (Kudryashev, op. cit. 36).

4. *P. angustifolia* Kudr. Rod Perovskia (1936) 23. — Ic.: op. cit., Fig. 11. — Exs.: HBP, No. 46; HFAM, No. 222.

Subshrub; stems to 1 m long, simple [or] branched, woody at base, sulcate, covered with short simple and branched multicellular hairs and sessile glands; leaves broadly lanceolate or oblong-lanceolate, 2.5–6 (7) cm long, 0.8–3 cm broad, subacute, glaucescent, more or less rugose, serrate, covered on both sides with numerous glands, cuneate at base, the petiole 0.4–0.6 cm long; floral leaves 1.5–2.5 cm long, 0.2–0.5 cm broad; bracts lanceolate, acute, 0.8–1 mm long, 0.3–0.5 mm broad, the margin densely white-ciliate; flowers subsessile or on heavily pubescent pedicel to 4 mm long, more or less spreading, at length nodding; verticillaster 2–6 (10)-flowered, distant, forming a loose paniculate inflorescence 17–22 (30) cm long; calyx 6 mm long, mostly violet or green (f. *albiflora* Kudr.), bilabiate, densely covered with long simple spreading whitish-violet multicellular hairs and glands, less hairy in upper part, the tube 5 mm long, 2 mm broad, obscurely 3-toothed; lower lip 2 mm long and as broad, 2-toothed, the teeth acute, 1.5 mm long, 1 mm broad, with densely ciliate margin; corolla violet or white (f. *albiflora* Kudr.), 1–1.2 (1.4) cm long, twice length of calyx, subglabrous, sparsely glandular, the tube exerted, 0.7–0.8 (1) cm long, 1.5 mm broad, the limb bilabiate; upper lip 4-lobed, 3–3.5 (4) mm long, 5.7 mm broad, pale at base, with dark violet stripes, the lobes ovate or rounded, unequal, the middle

1.5 mm long and as broad, the lateral longer and broader; lower lip oblong-ovate, 4–4.5 (5) mm long, 2.5 mm broad, entire; stamens 4, of these 2 fertile and 2 sterile; style with 2-parted stigma; nutlets obovoid, subtrigonal, 2.3 mm long, 1 mm broad, brown, glabrous. May–July.

Mountains, at altitudes up to 2200 m. Stony ground, usually along gravelly and stony beds of streams and brooks. — Centr. Asia: Pam.-Al., T. Sh. Endemic. Described from the Namangan District. Type in Leningrad.

**Economic importance.** This species deserves attention for its ornamental value, especially the white-flowered form.

The aerial parts, particularly the flowers and leaves, contain 0.5% essential oil of pale yellow color, easily separable from water (Kudryashev, op. cit. 28).

5. *P. virgata* Kudr. Rod Perovskia (1936) 28. — Ic.: op. cit., Fig. 12.

- 380 Subshrub; stems numerous, 40–60 cm long, strongly branched, slender, densely covered with short simple and branched multicellular hairs and numerous glands; leaves rhombic-lanceolate, 1.5–2 (4) cm long, 0.5–0.8 cm broad, obtuse, crenate or serrate, rugose, densely glandular-punctate, sparsely covered with short branched multicellular hairs, cuneate at base, with petiole 2–4 mm long; floral leaves 0.8–1.3 cm long, 0.3–0.4 cm broad; bracts 1 mm long, 0.3 mm broad, lanceolate, pubescent; flowers numerous, on pedicels 0.5–0.7 mm long, verticillasters 2–4-flowered, forming a loose virgate paniculate inflorescence 17–35 cm long; calyx tubular-campanulate, 5–5.5 mm long, densely covered with long multicellular and simple white hairs and glands, subglabrous in upper part with few hairs and glands, 8-nerved, bilabiate, the tube 4.5 mm long, 1.3–1.5 (2) mm broad; upper lip obscurely 3-toothed, 1 mm long; lower lip about as long, 2-toothed; both lips densely ciliate-margined; corolla violet, 0.9–1 (1.2) cm long, glandular outside, bilabiate, the tube 5.5–6.5 cm [sic] long, 1–2 mm broad, prominently exserted; upper lip 4-lobed, 3.5 mm long, 5 mm broad, the lobes small, oblong-obovate, rounded, the middle 1 mm long, 1 mm broad, the lateral 1.5 mm broad; lower lip oblong-elliptical, 2.5 mm long, 1 mm broad; stamens 4, of these 2 reduced, small, included; style exserted, with 2-parted stigma; nutlets obovoid, 2.5 mm long, 1 mm broad, brown, smooth. July–September.

Stony ground, pebbly terraces, taluses, rocks, river banks and valleys (up to 2200 m). — Centr. Asia: Pam.-Al. Endemic. Described from Kalaikhum. Type in Leningrad.

6. *P. linczevskii* Kudr. Rod Perovskia (1936) 30. — Ic.: op. cit., Fig. 12 (calyx).

Subshrub; stems 60–70 cm long, erect, sulcate, woody at base, branched, densely covered with short branched multicellular hairs and numerous glands; leaves lanceolate or oblong-lanceolate, obtuse, 2–4 cm long, 1.5 cm broad, crenate-serrate, covered (especially when young) with short branched multicellular hairs and numerous glands, cuneate-tapering at base, with petiole 3–5 mm long; floral leaves smaller, 1–1.5 cm long, 0.4–0.6 cm broad; bracts 1.5 mm long, 1 mm broad, lanceolate, acute, hairy; flowers numerous, on densely tomentose pedicels 2 mm long; verticillasters 2–4-flowered, distant, forming a strongly branched paniculate inflorescence to 30 cm long; calyx 4–5 mm long, violet, briefly bilabiate, densely covered with numerous [?]



381 branched hairs and golden glands, the margin densely ciliate; calyx-tube tubular-campanulate, 3–4 mm long and 2 mm broad, 8-nerved; upper lip obscurely 3-toothed, 1.5 mm long, 2.5 mm broad; lower lip 1 mm long, 2.3 mm broad, with 2 minute teeth; corolla violet or white (*f. albiflora* Kudr.), 0.8–0.9 cm long, sparsely glandular outside, bilabiate, the tube exserted, 6 mm long, 1.3–2 mm broad; upper lip 4-lobed, 1.5 mm long, 3.5–4 mm broad, the lobes ovate to suborbicular, unequal, the middle 0.5 mm long, 0.7 mm broad, the lateral 1 mm long and as broad; lower lip oblong-elliptical, 2 mm long, 1.5 mm broad, obtuse, entire; stamens 4, of these 2 sterile; style exserted, with 2-parted stigma; nutlets obovoid, 2 mm long, 1.2 mm broad, smooth, brown. September–October.

In mountains at altitudes between 850 and 1200 m; crevices, clefts, and stony placers of conglomerate rock. — Centr. Asia: Pam.-Al. Endemic. Described from the Dashti-Dzhuma area, Zarbuza River basin, Vashpusht Pass. Type in Leningrad.

Tribe 6. SATUREJEAE Briq. in *Pflanzenfam.* IV, 3a (1895) 208. — Calyx campanulate or tubular (very rarely inflated in fruit), the teeth not aristate-pointed; corolla bilabiate or almost regular, with weakly differentiated lobes; upper lip flat or but slightly incurved; anthers ovoid.

Subtribe A. *Melissinae* Endl. *Gen.* (1838) 618; Briq. in *Pflanzenfam.* IV, 3a, 208 et 292. — Calyx campanulate or tubular, 10–13 (15–20)-nerved, bilabiate ( $\frac{3}{2}$  arrangement), rarely regular; corolla bilabiate, with flat lobes; stamens 2–4, ascending under the upper lip; herbs, subshrubs or shrubs.

### Genus 1288.\* *Ziziphora*\*\* L.

*L. Sp. pl.* (1753) 21. — *Faldermannia* Trautv. in *Bull. Acad. Sc. Pétersb.* VI (1840) 185

382 Calyx elongated, narrowly tubular, 13-nerved, very obscurely bilabiate, with 3-toothed upper and 2-toothed lower lip, the short teeth mostly at length connivent, villous in throat; corolla small, the tube not or scarcely exserted, dilated at throat, without a ring of hairs; upper lip erect, entire; lower lip mostly spreading, 3-lobed, the lobes rounded, the middle lobe the longest, emarginate; fertile stamens 2, ascending under upper lip; anthers coherent at margin, unilocular or with a second

\* Treatment by S. V. Yuzepchuk.

\*\* The meaning of this generic name is not clear. It is usually said to be derived from the Arabic (or Hindustani?) word *zizi* and the Greek *pherein* or *phoros* (to bear, bearing). Some sources associate it with the generic name *Zizyphus* or, in the transcription adopted by Linnaeus, *Ziziphus* (*jujube*); the transcription *Zizyphora* has accordingly been adopted by some authorities (notably Boissier).

locule reduced to a columnar appendage at the base of the anther; staminodes very short, with or without abortive bilocular anthers; style 2-branched at apex, with a very small posterior branch; flowers in few-flowered verticillasters, very often crowded in upper part of stem and branches, sessile or pedicellate. Perennials or subshrubs, resembling in habit some species of the genus *Thymus*, or annuals similar to *Acinos*; leaves entire or scarcely toothed.

Over thirty species distributed in the Mediterranean region, in Near and Central Asia. Nearly all of them are strongly aromatic and contain large amounts of essential oil.

**Economic importance.** The essential oils of *Ziziphora* species have a characteristic agreeable scent and are used in perfumery, particularly for production of soap, tooth powder and paste, and synthetic menthol.

In processing *Ziziphora* it is necessary to use fresh plants, as up to 43% of essential oil is lost upon drying.

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  1. Perennial plants (subshrubs) . . . . . 2.
  - + Annuals . . . . . 19.
  2. Calyx whitish or white with a dense compact cover of long spreading hairs, these as long as or exceeding the diameter of calyx . . . . . 3.
  - + Calyx greenish or grayish, glabrous or covered with hairs much shorter than calyx diameter or long hairs, if present, scattered and not forming a compact cover . . . . . 9.
  3. Xerophytic (mountain steppe) plants of the lower mountain zones; leaves more or less elongated, mostly lanceolate, more than twice as long as broad . . . . . 4.
  - + High-mountain plants; leaves not more than twice as long as broad (often suborbicular) . . . . . 6.
  4. Stems stout, mostly erect; flower-heads terminal, ovoid or oblong . . . . . 5.
  - + Stems slender, flexuous; flower-heads small, hemispherical . . . . . 8. *Z. galinae* Juz.
  5. Stems very sturdy, quite erect, strongly branched; each branch terminating in a flower-head, hence heads numerous; upper branches of main stem usually abbreviated, hence the heads subsessile and composite inflorescence interrupted; leaves narrowly cuneate at base, subobtusate or obtuse at apex . . . . . 9. *Z. interrupta* Juz.
  - + Stems weaker, somewhat flexuous, simple or sparingly branched, with few isolated heads (usually 1 to 3); leaves rounded or broadly cuneate at base, abruptly narrowed to petiole, acute at apex . . . . . 4. *Z. biebersteiniana* Grossh.
  6. Low plants of S. Caucasus; stems patent-hairy; inflorescences few, hemispherical . . . . . 13. *Z. raddei* Juz.
  - + Stems covered with recurved hairs; inflorescences larger, spherical . . . . . 7.
  7. Plants of the main Caucasus range; leaves glabrous or subglabrous; corolla-tube not exserted . . . . . 17. *Z. puschkinii* Adams.
  - + Plants of Central Asia; leaves more or less hairy; corolla-tube exserted . . . . . 8.
  8. Plants of Tien Shan; inflorescences not completely spherical; flowers on distinct pedicels ca. 1.5 mm long; calyx dark purple, relatively sparsely hairy, the hairs somewhat shorter than calyx diameter . . . . . 11. *Z. tomentosa* Juz.

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- + Plants of Pamiro-Alai; inflorescences more or less compact, spherical; flowers on very short pedicels; calyx green or faintly purple, densely hairy, the hairs equaling or exceeding calyx diameter . . . . . 12. *Z. pamiroalaica* Juz.
- 9. Leaves lanceolate, more than twice as long as broad . . . . . 10.
- + Leaves ovate or suborbicular, not more than twice as long as broad . . . . . 15.
- 10. Stems covered with long, horizontally spreading hairs; leaves covered on both sides or only beneath with rather long spreading hairs . . . . . 5. *Z. brantii* C. Koch.
- + Stems covered with short retrorse hairs; leaves glabrous or short-haired . . . . . 11.
- 11. Calyx glabrous or apparently pruinose, the minute hairs visible only with a magnifying glass . . . . . 12.
- + Calyx covered with longer, readily visible hairs . . . . . 13.
- 12. Teeth of fruiting calyx suberect, distinct; Central Asian plant . . . . . 1. *Z. bungeana* Juz.
- + Teeth of fruiting calyx connivent, indistinct; Caucasian plant . . . . . 2. *Z. serpyllacea* M. B.
- 13. Transcaucasian plant with acute leaves . . . . . 3. *Z. rigida* (Boiss.) H. Braun.
- + Central Asian plant with subobtusate or obtuse leaves . . . . . 14.
- 14. Stems branched only at summit, the branches short; leaves minutely puberulent all over the surface beneath (apparently pruinose) . . . . . 6. *Z. brevicalyx* Juz.
- + Stems branched nearly the whole length, the branches elongated; leaves hairy on the veins beneath . . . . . 7. *Z. turcomanica* Juz.
- 15. Stems densely covered with long spreading hairs . . . . . 16. *Z. woronowii* Maleev.
- + Stems covered with short recurved hairs . . . . . 16.
- 16. Transcaucasian plants with slightly exserted corolla-tube . . . . . 17.
- + Corolla-tube not exserted . . . . . 18.
- 17. Stems robust, mostly erect, simple or sparingly branched; lower floral leaves relatively broader than cauline leaves; calyx covered with minute hairs and in upper part also with numerous long stiff spreading hairs . . . . . 15. *Z. denticulata* Juz.
- + Stems weaker, mostly ascending, strongly branched; lower floral leaves resembling the cauline (not broader); calyx covered only with minute hairs or also with long spreading hairs scattered all over . . . . . 14. *Z. borzhomica* Juz.
- 18. West Siberian plants with robust erect stems; leaves more or less hairy, the petiole up to 5 mm long . . . . . 10. *Z. clinopodioides* Lam.
- + Plants of the Main Caucasian Range with weak ascending stems; leaves glabrous, short-petioled . . . . . 17. *Z. puschkini* Adams.
- 19. Verticillasters closely approximate, forming spherical or subspherical capitate inflorescences; lower floral leaves abruptly attenuate to a point from very broadly rounded or broad-ovate base . . . . . 20.
- + Verticillasters more or less distant; inflorescence elongated, spikelike; floral leaves narrower, gradually acuminate . . . . . 21.
- 20. Cauline leaves lanceolate; floral leaves broad, suborbicular . . . . . 18. *Z. capitata* L.
- + Cauline leaves ovate or elliptical; floral leaves narrower, ovate or broad-ovate . . . . . 19. *Z. capitellata* Juz.
- 21. Anthers unappendaged or rarely appendaged at base; inflorescence compact, ovoid or oblong-ovoid; floral leaves markedly dilated in lower part . . . . . 22. *Z. persica* Bge.



- + Anthers with a corniculate or clavate appendage at base; inflorescence elongated, rather lax, cylindrical, at least at the final stage of flowering; floral leaves linear or lanceolate, not distinctly dilated in lower part . . . . . 22.
- 22. Flowers 12–15 (17) mm long; limb of corolla large, campanulate, divided above the middle into two correct lips . . . . . 20. *Z. taurica* M. B.
- + Flowers 8–10 mm long; limb of corolla small, not campanulate; corolla-tube passing rather abruptly into more or less spreading lips . . . . . 21. *Z. tenuior* L.

Section 1. **Serpyllaceae** Benth. in DC. Prodr. XII (1848) 364; Briq. in Pflanzenfam. IV, 3a, 293. — Perennials with many stems, usually with a woody caudex (i.e. subshrubs); verticillasters crowded at ends of stems and branches; anthers naked, attached to filaments at or slightly above the middle, not appendaged at base.

Note. Karl Koch already wrote (Linnaea, 17, 1843, 292) about this section: “Ziziphorae species frutescentes difficillimae . . .” These species are indeed exceedingly polymorphic and, in most instances, represent vicariads that are often insufficiently distinctive and have for a long time presented considerable difficulties to taxonomists. Innumerable intermediate and overlapping forms, unidentifiable by means of keys, crop up continuously. Moreover, the amount of material available is very limited with regard to some species.

Notwithstanding this prevalence of vicarism, we find it impossible to place all the species of this section in a single series. Further studies will be necessary to test the merits of the subdivision into tree series that we propose as a working scheme. The first two series correspond to *Z. serpyllacea* M. B. sensu amplissimo auctorum (or else *Z. clinopodioides*  $\alpha$ . *canescens* Benth.) and contain the narrow-leaved species of the section; the third series corresponds to *Z. clinopodioides* Lam. sensu amplissimo auct. (or *Z. clinopodioides*  $\beta$ . *media* Benth.) incorporating *Z. puschkinii* Adams (*Z. dasyantha* M. B.), i.e. embracing the broad-leaved species. It may be seen that the proposed classification is to some extent in agreement with earlier traditions.

- 386 Series 1. *Eu-Serpyllaceae* Juz. — More or less xeromorphic forms of the lower mountain zones (mountain steppe); flowers in a hemispherical, ovoid or obconical terminal head; leaves narrow, mostly lanceolate; calyx apparently pruinose with minute hairs visible only with a magnifying glass.

1. *Z. bungeana* Juz. sp. n. in Addenda, XX, 664. — *Z. clinopodioides* Bge. apud. Ldb. Fl. alt. I (1829) 20 (excl. syn.) et auct. fere omnium fl. As. Med. non Lam. — *Z. clinopodioides*  $\alpha$ . *canescens* Benth. Lab. Gen. et sp. (1833) 321, p. p.; Ldb. Fl. Ross. III, 369, p. p. — *Z. rigida* Pavlov, Rast. res. Yuzhn. Kazakhst. (1947) 87, non H. Braun.

A strongly scented subshrub; root woody, flexuous; rhizome also woody, branched; stems numerous, 12–30 cm long, rather stiff, somewhat ascending at base of suberect,

simple or branched, erect or curved, rarely flexuous, densely covered with short recurved hairs, whitish in upper part with more copious indument; leaves 0.5–1.5 cm long, 1.5–6 mm broad, narrowly lanceolate, lanceolate or ovate-lanceolate, narrowed at both ends, acute or rarely obtusish at apex, entire, subglabrous or more often with bloom-like pubescence on both sides or only beneath, distinctly punctate-glandular, usually with 2–3 veins on each side, usually prominent beneath; petiole to 4 mm long, densely covered with very short hairs; floral leaves resembling the cauline but much smaller, often linear-lanceolate to sublinear, mostly ascending and appressed to calyx or horizontally spreading but usually not recurved, the margin not ciliate; inflorescences at ends of stems and branches, capitate, mostly hemispherical, rather loose, relatively many-flowered; pedicels to 1.5–3 (4) mm long; calyx ca. 5 mm long, narrow, canescent with a dense cover of very short hairs (visible only with a magnifying glass) and with scattered translucent punctate glands; calyx-teeth subacute, often somewhat spreading at anthesis, erect in fruit and usually not or incompletely connivent and thus readily distinguishable; corolla to 8 mm long, about half as long again as calyx, pink, the tube scarcely exerted, the limb fairly large. July–August.

Exposed rocky sites (mountain outcrops); stony, gravelly or clayey slopes, grass-and-forb steppes. — W. Siberia: Alt., Irt.; Centr. Asia: Balkh., Ar.-Casp., Dzu.-Tarb., 387 T. Sh., Pam.-Al., Mtn. Turkm. **Gen. distr.:** Mong., Dzu.-Kash. Described from Batov picket (Nor-Zaisan) and Ust'-Kamenogorsk. Type and paratypes in Leningrad.

**Note.** Bunge distinguished this species successfully and correctly from the Altai mountain plant but, for unknown reasons, he erroneously identified it with Lamarck's *Z. clinopodioides* (confounding the true *Z. clinopodioides* Lam. with *Z. media* Link.). Ledebour, who did not accept the segregation of the two species proposed by Bunge, was clearly taking into consideration the overlapping of characters and the occurrence of intermediate forms. However, the two species cover vast territories, with quite different climatic conditions, and they can usually be readily distinguished.

Being widely distributed through Central Asia, *Z. bungeana* shows considerable polymorphism. Among the most variable characters are general habit, leaf width, length of pedicels and flower size (particularly length of calyx).

**Economic importance.** According to data presented by S. N. Kudryashev (also cited by N. V. Pavlov), the aerial parts of plants (harvested with inflorescences) contain 0.2–0.4% essential oil. This is composed of pulegone (nearly 70%) and other ingredients such as methol and alpha-pinene (Kudryashev, *Efirno-maslichnye r. i ikh kul'tura v Sr. Azii*, I, 1936, 273; see also: Pavlov, *Rastit. resursy yuzhn. Kazakhstana*, 1947, 87).

2. *Z. serpyllacea* M. B. Besch. d. Länd. zw. Terek u. Kura (1800) 127; ej. Fl. taur.-cauc. II, 18. — *Z. clinopodioides*  $\alpha$ . *canescens* Benth. Lab. Gen. et sp. (1833) 321, p. p.; Ldb. Fl. Ross. III, 369, p. p. — *Z. clinopodioides*  $\alpha$ . *serpyllacea* Boiss. Fl. or. IV (1879) 585, p. p.; Shmal'g. Fl. II, 314. — *Z. clinopodioides* var. *odoratissima* A. Wysoczin in sched. ad Herb. exs. Hort. bot. Jurjev. (sine n<sup>o</sup>). — *Z. muscini* Adams in Weber et Mohr in Beitr. z. Naturkunde, I (1805) 43. — *Z. stenophylla* Juz. in sched. et ex Ter-Chatschat. Fl. Gruz. VII (1952) 329 (georgice). — **Ic.:** Buxb. Pl. minus cogn. cent. III, tab. LI, fig. 2 (sec. Adams; nobis mala videtur); Rud. in

Mém. Acad. Sc. Pétersb. II, tab. XII; Ter-Khachat. in Fl. Gruz. VII, Table 329. — Exs.: Herb. exs. Hort. bot. Jurjev. (sine n<sup>o</sup>).

388 A low or medium-sized, strongly aromatic subshrub, 5–25 (30) cm high, branching at base; stems simple or mostly branched, woody at base, mostly decumbent or arcuately ascending or suberect, mostly curved or flexuous, rather stiff, greenish or faintly reddish, rarely dark purple, densely (or in upper part very densely) covered with short or very short recurved hairs; internodes moderately long; leaves 3.5–12 (15) mm long, (0.5) 1–3.5 mm broad, pale green in dry state, subcoriaceous, mostly rather thick, covered beneath over the whole surface or only on the veins and at margin with numerous minute hairs, mostly subglabrous above, narrowly or broadly lanceolate, broadest at or slightly below the middle, gradually narrower toward apex and toward base, acute, mostly entire or the upper sometimes with 1 or 2 small teeth at each side, all eciliate, with (2) 3 (4) veins each side of midrib, rather distinctly glandular-punctate, the petiole short or very short, mostly not exceeding 1.5 mm, densely puberulent; floral leaves resembling the cauline but smaller, as long as or shorter than calyx, ciliate; branches shorter than stems, erect to spreading, curved or somewhat undulate; rameal leaves much smaller; inflorescence mostly depauperate, at ends of stems and branches, loosely capitate, hemispherical or obconical, often with divaricate flowers, (1.5) 1.8–2.3 cm in diameter, of equal width or the lateral mostly smaller; pedicels 1–2.5 mm long; flowers 7–9 (11) mm long; calyx narrow, 4–5.5 (6.5) mm long, mostly green or partly lilac-tinged, with dense short hairs, to the naked eye apparently smooth or covered with a bloom, the teeth subobtuse, erect at anthesis, finally connivent; corolla small, medium-sized or sometimes fairly large, the tube more or less exserted, with linear or punctate speckles in throat; stamens rather long; nutlets to 1.75 mm long, blackish in maturity. June–August.

Exposed hills, dry stony slopes, stony places along river banks, on limestone. — Caucasus: Dag., E. Transc. Endemic. Described from mountains in Shirvan Province (ex provinciae Schirvan montibus). Type in Leningrad.

Note. Polymorphic, like the preceding species. Further studies may disclose a number of local forms or races. It should be pointed out that *Z. mussini* Adams (Plate XX, Fig. 5), described from the Tbilisi area, is a low-growing form, characterized by corymbose branching in upper part, narrowly lanceolate leaves, and relatively large flowers with an elongated calyx. There is a high-stemmed form from Kirovabad, with exceptionally narrow leaves, and relatively small flowers and flower-heads; for a time we designated it in the herbaria as *Z. stenophylla* Juz.

**Economic importance.** According to A. A. Grossheim, the oil output of *Z. serpyllacea* is 0.3–0.4%. The oil is pulegone-scented and contains pulegone, limonene, dipentene, pinene, etc. It is known in the perfume industry as “Ziziphora oil” and is used in the manufacture of soap and cosmetics.

389 Series 2. *Rigidae* Juz. — Resembling the preceding series in structure of inflorescence and leaf shape; stems mostly rigid and erect, rarely flexuous; indument of calyx consisting of short or long but always readily visible hairs. A predominantly Iranian group, represented only near the southern border of Caucasus and Central



Asia (with the exception of *Z. interrupta* Juz. which occupies a somewhat isolated position within the series).

Note. The reason for separating this series from the preceding is the fact that the Central Asian species grow in places where forms of the polymorphic *Z. bungeana* (referred to the series *Eu-Serpyllaceae*) also occur.

3. *Z. rigida* (Boiss.) H. Braun in Verhandl. der Zool.-Bot. Ges. Wien, XXXIX (1889) 222. — *Z. clinopodioides* γ. *rigida* Boiss. Fl. or. IV (1879) 586, saltem pro max. parte (excl. probab. syn. *Z. fasciculata* C. Koch et pl. *Cabulica* necnon e *Belutschia*). — *Z. fasciculata* Grossh. Fl. Kavk. III (1932) 327 p. p., vix autem C. Koch ined.

A subshrub (apparently lignified in lower part to a greater extent than other species of this section), 15–35 cm high (and higher?); stems woody at base, arched-ascending or suberect, branched at base and in upper part, straight or flexuous, hard and rigid, in live or freshly dried plants probably pale purple, densely covered with very short deflexed hairs (apparently pruinose to unaided eyes); leaves 8–15 mm long, 2–7 mm broad, yellowish-green in the herbarium, firm, rather thick, lanceolate, broadly lanceolate, oblong-lanceolate or sometimes narrowly ovate, often conduplicate, broadest at or below the middle, gradually narrowed at both ends, acute or subacute, entire, eciliate, with 3–5 prominent lateral veins, sparsely (or very sparsely above) covered with short or very short hairs (almost pustular above), very distinctly punctate; petiole 1–1.5 mm long; lowest floral leaves resembling the upper cauline or usually somewhat shorter (and sometimes somewhat wider), more briefly attenuate at apex, the petiole dilated, beset like the lower part ( $\frac{1}{4}$ – $\frac{1}{2}$ ) of blade with fairly long spreading white cilia, spreading or occasionally reclinate; other floral leaves smaller; upper branches well developed, mostly long or very long, usually simple, suberect to subdivaricate, with 2–4 pairs of somewhat diminutive leaves; inflorescences at ends of stems and branches, rather compactly  
390 capitate with 1–2 subdistant verticillasters, subspherical, 2–3 cm in diameter, the lateral about half the size; pedicels short, the lowest to 2 mm long; flowers 7–10 mm long; calyx 4–5 (6) mm long, green, minutely puberulent and with varying amount of shortish to fairly long hairs, these sometimes equaling calyx diameter; corolla with exerted tube and fairly large limb (color unknown); nutlets ca. 1.5 mm long, pale brown. May–August.

Pebble beds and clayey places. — Caucasus: S. Transc. Gen. distr.: Iran (N.). Described from the vicinity of Nakhichevan (type) and from Khoi area in N. Iran. Type and paratype in Geneva; isotype in Leningrad.

Note. The appellation *Z. fasciculata* C. Koch, accepted for this species by Grossheim is not valid as, to the best of our knowledge, it has never been properly published, this as opposed to the name adopted by us. It may be mentioned that, beside *Z. rigida*, Grossheim also referred to *Z. fasciculata* C. Koch the form "Z. stenophylla Juz." (mentioned above in the note to *Z. serpyllacea* M. B.). We have no idea as to what Koch himself conceived under the name *Z. fasciculata*.

**Economic importance.** The essential oil of this plant is pulegone-scented and can be used in soap manufacture; the oil yield, according to Grossheim, amounts to 0.27%.



PLATE XX. 1 – *Ziziphora capitata* L., general aspect; 2 – *Z. tenuior* L., general aspect, flower; 3 – *Z. taurica* M.B., flower; 4 – *Z. clinopodioides* Lam., general aspect, flower; 5 – *Z. mussini* Adams, summit of stem, flower; 6 – *Z. puschkinii* Adams, flower.

4. *Z. biebersteiniana* Grossh. Fl. Kavk. III (1932) 326. — *Z. dasyantha* Benth. Lab. Gen. et sp. (1833) 321 p. p. non M. B. — *Z. clinopodioides* γ. *dasyantha* Ldb. Fl. Ross. III (1840–1851) 369, p. p.; Boiss. Fl. or. IV, 586, p. p. — *Z. clinopodioides* var. *biebersteiniana* Grossh. in Tr. Tifl. bot. sada, II, 1 (1920) 18 and 19.

Subshrub, 18–30 cm high, strongly branched at base; stems ascending, strongly lignified at base, curved and often flexuous, rather slender, hard and rigid, suffused in varying degree with purple, rather densely covered with short or very short hairs, at least the upper internodes elongated; leaves 6–13 mm long, 3–6 mm broad, broadly lanceolate or ovate-lanceolate, broadest in middle part, mostly below the middle, narrowed at base to petiole, acuminate or subacuminate at apex, entire or the upper sometimes with 1 or 2 scarcely perceptible teeth, all eciliate, with 3–4 prominent veins each  
393 side of midrib, yellowish-green in dry state, coriaceous, often rather thick and firm, sparsely (the uppermost rather densely) covered on both sides with short or very short pubescence (visible with magnifying glass), clearly punctate, the petiole 1–2.5 mm long; branches none or few, mostly long, subdivaricate to suberect, slightly flexuous, the uppermost pair often much shorter and more spreading than the rest; inflorescences in upper part of stems, loosely capitate, ovoid or rarely capitate, the lateral poorly developed or sometimes abortive; pedicels 1.5–2 mm long; flowers 6–10 mm long, markedly reclinate, forming an obtuse angle with the pedicel; calyx 4–5 mm long, green or on one side violet, often strongly curved, densely covered with fairly long white hairs (equaling or exceeding calyx diameter); corolla medium-sized to fairly large, the tube long-exserted; stamens rather short; nutlets so far unknown. May–August.

Stony places, dry slopes. — Caucasus: Tal., S. Transc. Gen. distr.: Iran, Arm.-Kurd. Probably described from Zuvant. Type (or isotype) in Leningrad.

Note. We rather suspect that *Z. biebersteiniana*, as here conceived, is not fully autonomous, but is most likely an intermediate form, representing a link between *Z. rigida* (Boiss.) H. Braun and one of the forms (perhaps as yet undetected) belonging to the *Dasyanthae* Juz. group (of the *Z. raddei* or *Z. pamiroalaica* type).

Economic importance. Essential oil with peppermint scent; yield of oil 0.24% (according to Grossheim).

5. *Z. brantii* C. Koch in Linnaea, XVII (1843) 294 nec aliorum.

Subshrub of medium size, 10–25 cm high, with a strong woody root and prostrate caudex; stems mostly numerous, rather robust, suberect, mostly purple, simple or branched, rather densely covered all over with longish, stiff, horizontally spreading hairs; leaves all alike, 0.6–0.8 cm long, 1.5–4 mm broad, oblong or lanceolate, broader at or slightly below the middle, narrower at base to a short petiole, mostly subobtuse, entire, flat or with scarcely revolute margins, rather thick and rigid, inconspicuously veined beneath, patent-hairy on both sides, the hairs scattered and short above, longer and stiffish beneath; floral leaves resembling the cauline but smaller; branches suberect, long, terminating in small heads; inflorescence 1.5–2 cm in diameter, loosely  
394 capitate, ovoid, to subspherical; pedicels 1–2 mm long; calyx 4–6 mm long, narrow, minutely hairy and often with scattered, moderately long, stiffish spreading hairs, green or faintly lilac-tinged, the teeth lanceolate, subacute; corolla to 1 cm long, the tube at length exserted; style very long; stamens slightly exserted. July–August.



Mountain slopes. — Possibly growing in S. Transcaucasia. **Gen. distr.:** Arm.-Kurd., Asia Minor (E. Anatolia). Probably described from the vicinity of Erzerum. Type in Berlin.

**Note.** Inclusion of this species in the Flora of the U.S.S.R. is prompted by the fact that it has been reported for the Caucasus and it occurs near its border. So far, however, it has apparently not been collected by anyone on Soviet territory and existing reports probably refer to other species (e.g. *Z. denticulata* Juz.).

6. *Z. brevicalyx* Juz. sp. n. in Addenda XX, 664.

Subshrub, 20–30 cm high, with a strong woody root; caudices long, upright, strongly branched; stems very numerous, very slender, stiff and brittle, curved, light brown, mostly branched, covered with very short curved hairs, mostly persisting till the following year and then turning gray; leaves 0.4–1 cm long, 1.5–4 mm broad, light green, thinly coriaceous, covered on both sides (sparsely above and rather densely beneath), apparently pruinose with minute hairs (visible only with a magnifying glass), lanceolate or narrowly ovate, flat, broadest at or slightly below the middle, gradually narrowed below into a short but distinct petiole, subobtuse or obtuse or even rounded at apex, prominently veined beneath, clearly punctate, the petiole to 2.5 mm long; floral leaves resembling the cauline but very small, shorter than calyx; branches mostly numerous, borne on upper part of stem, rather short, erect to divaricate, often branched in turn; inflorescences at ends of stems and branches, rather dense, hemispherical, 1–1.5 cm in diameter; pedicels ca. 1 mm long; flowers 6–8 mm long; calyx 3–4.5 mm long, green, minutely puberulent and with fairly numerous shortish, horizontally spreading hairs, these less than half diameter of calyx; corolla about twice as long as calyx, the tube strongly exerted, the limb relatively large, whitish in dry state. July–September.

395 Rocks, gravelly mountain slopes. — Centr. Asia: Pam.-Al. (Baisun district, Uzbek SSR, Tadzhik SSR). Endemic. Described from Babatag range, near the village Chagam. Type and paratype in Leningrad.

7. *Z. turcomanica* Juz. sp. n. in Addenda XX, 665.

Subshrub, 15–40 cm high, with a woody root; caudex woody, upright, branched at summit; stems numerous, rather slender, rigid, erect or suberect or somewhat flexuous, mostly long-branched, sometimes almost implexed, light brown, rather sparsely covered with short recurved hairs; leaves 4–10 mm long, 1–4 mm broad, lanceolate, narrowly ovate or oblong, mostly broadest at the middle, gradually narrowed below to a distinct petiole, subobtuse to obtuse at apex, entire or very often with distant small teeth, light grayish-green, often conduplicate, coriaceous, covered (sparsely above, rather densely on the veins beneath) with minute hairs, apparently pruinose, with prominent lateral veins beneath, distinctly punctate, the petiole to 2 mm long; floral leaves small, subspatulate, much shorter than calyx; branches mostly numerous, borne all along the stem, elongated, subdivaricate to suberect, often similarly branched in turn; inflorescences at

ends of branches, hemispherical or subconical, 1–1.8 cm in diameter; pedicels not exceeding 1 mm in length; flowers ca. 7 mm long; calyx 3.5–5 (mostly 4) mm long, green, minutely puberulent and rather densely covered with shortish, horizontally spreading hairs, these less than half diameter of calyx; corolla one-and-a-half times as long to twice as long as calyx, the tube exerted, the limb ca. 3–4 mm broad, whitish or pale pink in dry state. June–July.

Grassy mountain slopes. — Centr. Asia: Mtn. Turkm. **Gen. distr.:** Iran? Described from Gaudan. Type in Leningrad.

Note. Like the preceding species, which it closely resembles, *Z. turcomanica* is one of the forms that have not yet been sufficiently explored.

8. *Z. galinae* Juz. sp. n. in Addenda XX, 666.

Aromatic subshrub, densely cespitose (nearly pulvinate) from a compactly multicapital strong woody caudex; stems very numerous, 4–22 cm long, mostly sterile, only 396 some considerably elongating, simple or branched in upper part, slender, subfiliform, somewhat flexuous, sparsely covered with very short curved hairs, rubescent, with strongly elongated internodes; leaves small, 3.5–10 mm long, 1–3.5 mm broad, rigid, lanceolate, broadest below the middle, narrowed at base to a short petiole, subacute or acute at apex, entire, glabrous or scarcely pubescent above, sparsely covered all over beneath with minute hairs, rather dark green, somewhat prominently veined beneath, rather obscurely punctate; lateral branches very slender, short; floral leaves resembling the cauline but smaller, shorter than calyx, horizontally spreading or some reflexed; inflorescence small, 1.3–2 cm long, hemispherical, fairly compact; flowers ca. 8 mm long, on very short pedicels; calyx ca. 5 mm long, narrow, dark purple, rather densely covered with horizontally spreading hairs, these somewhat shorter than diameter of calyx; corolla about one-and-a-half times as long as calyx, the tube exerted. June–July.

Stony outcrops. — Centr. Asia: Mtn. Turkm. (Bol'shye Balkhany). Endemic. Described from Dyunesh-Kala (1770 m). Type in Leningrad.

Note. An insufficiently explored form, rather clearly distinguishable from *Z. turcomanica* by the weaker, strongly flexuous stem; more acute, dark green leaves, glabrous above; calyx more profusely covered with longer hairs; larger flowers. We relate this species to *Z. turcomanica*, even though it has been associated in the key, on the basis of a formal character (indument of calyx) with quite different species.

9. *Z. interrupta* Juz. sp. n. in Addenda XX, 667. — *Z. clinopodioides* var. *rigida* M. Pop. in sched. ad HFAM. IX (1926) 25, non Boiss.

A tall subshrub, 28–50 cm high; stems woody in lower part, erect or suberect, branched at base and in upper part or all along, strict, stout, rigid, mostly reddish or dark purple, sparsely (only in upper part rather densely) and minutely pubescent (seemingly pruinose); leaves 8–18 mm long, 2–5 mm broad, pale green or fairly bright (yellowish) green, rather firm, moderately thick, minutely and finely pubescent (seemingly pruinose) on both sides or subglabrous above, lanceolate or broadly lanceolate, broadest in middle part or somewhat below the middle, gradually long-attenuate at base

397 to a petiole, obtuse or subobtusely, cartilaginous-tipped, entire, all eciliate, with 4–5 scarcely or slightly prominent veins on either side of midrib, rather distinctly punctate-glandular, the petiole at most one-fifth the length of blade, rather densely and minutely pubescent; floral leaves smaller, oblanceolate, eciliate, the lowest often reflexed; lateral branches mostly numerous, well developed, simple, erect or rarely subdivaricate, strict; inflorescence interrupted, the lower 1–3 verticillasters distant, the lowest very distant; terminal heads oblong, 1–1.8 cm in diameter, mostly rather loose; secondary inflorescences (on all lateral branches) well developed though less composite, hence the whole plant many-headed and many-flowered; peduncles ca. 1 cm long; pedicels 1–1.5 mm long; flowers 6–8 mm long; calyx short, 3–4.5 (5) mm in length, lilac-colored under white-lanate indument, densely covered with rather long white hairs, these often exceeding calyx diameter, the teeth very acute, with dense long hairs inside; corolla with exerted tube and medium-sized limb, apparently pale purple with purple spots on lower lip; anthers and style purple; mature nutlets unknown. June–August.

Pebble beds and riverside fields. — Centr. Asia: Pam.-Al. Endemic. Described from Sangardak River valley. Type in Leningrad.

Note. A plant closely related to this species appears in HFAM as No. 223 (under appellation presented as a synonym); it was described by A. I. Vvedenskii as a distinct species.

Series 3. *Clinopodioides* Juz. — Mountain (mainly high-mountain) plants, mostly with a spherical terminal flower-head and broad (often orbicular) leaves; calyx densely covered with long spreading hairs (group *Dasyanthae* Juz. ined.) or with scattered long or short hairs (group *Mediae* Juz. ined.).

Note. The group *Dasyanthae* contains the following species of the series *Clinopodioides*: Nos. 11, 12, and 13, as well as No. 17 (except forms resembling *Z. subnivalis* Chatschat.); the remaining species belong to the group *Mediae* Juz. The subdivision into these two groups is proposed as a matter of convenience, although it is purely artificial and of no phylogenetic significance. As regards the series *Clinopodioides* as a whole, its establishment is based on the assumption that the component broad-leaved species have developed independently. Should it be found that the Central Asian components are derived, say from *Z. bungeana* Juz., the East Transcaucasian *Z. denticulata* and *Z. borzhomica* Juz. from *Z. serphyllacea* M. B., and the South and West Transcaucasian *Z. raddei* Juz. and *Z. woronowii* Mal. from *Z. brantii* C. Koch., retention of the series *Clinopodioides* (as now constituted) would become impossible. Such filiation of the high-mountain forms of the section is, however, problematic. For instance, a species such as *Z. puschkinii* Adams would in any case remain unrelated to *Z. serphyllacea*; on the other hand, there is no doubt concerning its affinity to *Z. woronowii* Mal. and *Z. denticulata* Juz.

10. *Z. clinopodioides* Lam. Illustr. I (1791) 63; Shmal'g. Fl. II, 314, p. p.; Kryl. Fl. Zap. Sib. IX, 2374. — *Z. clinopodioides* var.  $\alpha$ . *Z. cunila* Rud. in Mém.



Acad. Sc. Pétersb. II (1810) 313. — *Z. media* Bge. apud Ldb. Fl. alt. I (1829) 21, vix autem Link. — *Z. linkii* Bge. in sched. — *Z. clinopodioides*  $\beta$ . *media* Benth. Lab. Gen. et sp. (1833) 321, p. p.; Ldb. Fl. Ross. III, 369, p. p. — Exs.: Kar. et Kir. No. 1842.

An aromatic subshrub; rhizome stout, woody, branched; stems numerous, 8–40 cm long, usually erect or rarely somewhat ascending, simple or slightly branched at base, usually more or less flexuous, hairy, the hairs short and recurved in lower part, more numerous and spreading near inflorescence; leaves 6–25 mm long, 3–12 mm broad, broadly elliptical, ovate or oblong-ovate, narrowed at base to petiole, short-acuminate at apex, entire or obscurely and remotely toothed, glandular-punctate, sparsely puberulent (mainly on the veins beneath) or mostly subglabrous, usually with 4 veins each side of midrib, slightly prominent beneath, the petiole one-fifth to one-quarter the length of blade, to 5 mm long, short-haired; floral leaves resembling the cauline but smaller, ciliate in lower part, the lower often reflexed; inflorescences at ends of stems, capitate, subspherical, compact, 1.5–3 cm in diameter; calyx 5–7 mm long, covered outside with rather short spreading hairs (these not exceeding half the calyx diameter), mostly rubescent on one side or sometimes dark purple all over, the teeth acute, very much shorter than the tube; corolla 10–12 mm long, about one-and-a-half times as long as calyx, rose-lilac or pale lilac, short-pubescent outside, the tube nearly twice as long as the large limb, not at all or slightly exerted. June–August. (Plate XX, Figure 4.)

Stony and rocky river banks; stony and gravelly slopes of mountains and hills.— W. Siberia: Alt.; E. Siberia: Ang.-Say.; Centr. Asia: Dzu.-Tarb. **Gen. distr.:** Mong., Dzu.-Kash.? Described from Siberia. Type in Paris.

Note. Lamarck undoubtedly had in mind the Altai mountain plant when he described his *Z. clinopodioides*: “foliis ovatis. . . calycibus pilosis subincanis”; also the name “clinopodioides” certainly fits the Altai plant better. It is therefore  
399 not quite clear why Bunge established an altogether different species as *Z. clinopodioides* Lam. (see note to *Z. bungeana* Juz.) while naming the actual plant *Z. media* Link (for the latter see note to *Z. denticulata* Juz.).

11. *Z. tomentosa* Juz. sp. n. in Addenda XX, 668. — *Z. clinopodioides* var. *tomentosa* C. Winkl. in sched.

Subshrub, with a slender flexuous root and branched prostrate caudex; stems few, prostrate or ascending, flexuous, 7–22 cm long, with scattered short hairs, more or less suffused with red, simple or with few spreading branches, the upper internodes considerably elongated; leaves 4–12 mm long, 2–8 mm broad, oblong to suborbicular, with petiole to 2 mm long, obtuse or rarely subacute, entire, rather thin, bright green, sparsely and finely short-pubescent or subglabrous, punctate-foveolate, the veins slightly prominent beneath; floral leaves resembling the cauline but smaller, mostly as long as or slightly longer than calyx, usually reflexed, somewhat undulate; heads spherical or mostly hemispherical, 1.2–2 cm in diameter, rather loose, the lowest verticillaster often distant; pedicels short but mostly distinct, to 1.5 mm; calyx 4–5 mm long, usually dark purple, moderately densely to densely covered with spreading white hairs, these equaling calyx diameter; corolla

with barely exerted tube and large limb, pale purple; anthers exerted. End of June to August.

Mountain stream valleys, screes. — Centr. Asia: T. Sh. (Centr.). Endemic? Described from Naryn range, Aksai valley, Chunkei-sai survey mark. Type in Leningrad.

Note. Closely resembling *Z. pamiroalaica* Juz. and, in some characters, representing a deviation toward the W. Siberian *Z. clinopodioides* Lam. and thus to some extent transitional.

12. *Z. pamiroalaica* Juz. apud Nevski in Tr. Bot. inst. AN SSSR, I, 4 (1937) 328, nomen; descr. in Addenda XX, 669. — *Z. schugnanica* Lipsch. in sched.

400 A strongly aromatic subshrub, with a strong woody flexuous root; rhizome woody, not [?] strongly branched, prostrate; stems numerous, rather slender or often fairly sturdy, mostly ascending at base or prostrate and arcuately curved, often flexuous, 7–30 cm high, covered with scattered short stiffish recurved hairs, more or less reddish, suberect or with few suberect or somewhat spreading branches mainly in lower part or sometimes all along, the internodes (especially the upper) strongly elongated; leaves small or medium-sized, 2–15 mm long, 1.5–7 mm broad, oblong-ovate to sub-orbicular, often conduplicate, narrowed at base to a distinct puberulent petiole to 3 mm long, obtuse or subobtuse, entire or obscurely toothed (usually with 1 or 2 teeth at each side), fairly thick, grayish- or rather dark-green, covered with scattered or moderately dense short fine hairs, sometimes subglabrous, mostly with slightly prominent veins beneath, distinctly glandular-punctate; floral leaves resembling the cauline but mostly smaller, usually not exceeding the calyx, often reflexed; heads spherical, 1.2–2.8 cm in diameter, rather compact; pedicels very short; calyx 4–6 mm long, straight or slightly curved, often covered with long white hairs (these about equaling or somewhat exceeding calyx diameter), green or suffused with purple; corolla with slightly exerted tube and large limb, pink; anthers prominently exerted, purple. July–August.

Stony places and screes in river valleys and gully slopes. — Centr. Asia: Pam.-Al. Gen. distr.: Dzu-Kash. Described from Alai valley. Type in Leningrad.

Note. It should be pointed out that the name of this plant, published as “nomen nudum” in Nevskii’s cited study, was mistakenly applied by this authority to a completely different plant (*Z. bungeana* Juz.).

13. *Z. raddei* Juz. sp. n. in Addenda XX, 669. — *Z. gundelsheimeri* Grossh. Opred rast. Kavk. (1949) 344, vix autem. C. Koch. — *Z. clinopodioides*  $\beta$ . *media* Ldb. Fl. Ross. III, 369 p. p.; non Benth.

Subshrub, 5–15 cm high; stems woody, ascending at base, mostly simple, strongly flexuous, mostly reddish, rather densely hairy, the hairs shortish, spreading, somewhat flexuous; lower leaves 4–7 mm long, 1.5–5 mm broad; upper leaves to 1 cm long, 7 mm broad, ovate to suborbicular, acuminate, often undulate, all entire, rather densely or sparsely hairy on both sides, the hairs shortish or moderately long, spreading, mostly recurved, the lower side with slightly prominent veins, punctate-glandular, the petiole fairly well developed, patent-hairy; floral leaves large, resembling and equaling the

upper cauline, mostly long-ciliate at margin in lower part, mostly horizontally spreading or occasionally reflexed; inflorescences solitary, loosely capitate, mostly hemispherical, 1.5–2.5 cm in diameter; pedicels distinct, 1–2 mm long; flowers 8–12 mm long; calyx 5–6 mm long, rather narrow, usually suffused with violet, moderately densely to densely covered with spreading hairs, these shorter than or more often equaling calyx diameter, the teeth acuminate-lanceolate, very much shorter than the tube; corolla with exserted tube, whitish in dry state. August.

Mountains. — Caucasus: S. Transc. (Aragats). **Gen. distr.:** Arm.-Kurd. (Armenia). Described from Mt. Ararat. Type in Leningrad.

Note. We have not seen authentic specimens of *Z. gundelsheimeri* C. Koch, described from Armenia without precise indication of location; we have therefore decided not to accept the approach of Grossheim who identified the Ararat plant with this species. Our plant does not fully match Koch's description of *Z. gundelsheimeri* which presents floral leaves as being very large, ovate-lanceolate, with revolute margins; the calyx-teeth of our plant also differ in being covered with hairs that mostly equal the calyx diameter.

14. *Z. borzhomica* Juz. in sched. 1935; descr. in Addenda XX, 671; Grossg. Opređ. rast. Kavk. 344, nomen. — **lc.:** Ter.-Khachat. in Fl. Gruz. VII, Plate 326.

Subshrub to 20 cm high, inodorous in dry state; stems prostrate woody at base, branched from base; branches numerous, ascending, flexuous, greenish or lilac, rather densely covered with short recurved hairs; leaves 6–14 mm long, 2.5–9 mm broad, pale green (in dry state), rather slender, glabrous on both sides, ovate or broadly lanceolate, broadest below the middle, often somewhat undulate, rounded or narrowed at base, the lower subobtusate or obtuse, the upper attenuate at apex and acute, obsoletely small-toothed toward apex, the upper long-ciliate in lower half, the others eciliate, with 3 or 4 lateral veins each side of midrib (these prominent in the uppermost cauline and the floral leaves, in others inconspicuous), obscurely punctate; petioles 1–2 mm long, very much shorter than blade, the lower glabrous, the upper sparsely hairy; lowest floral leaves resembling the upper cauline, scarcely broader, recurved, the others smaller, subrhomboid, long-ciliate nearly to apex, on somewhat dilated petiole; inflorescences at ends of branches, compactly capitate, subspherical; pedicels ca. 1 (rarely 2) mm long; flowers to 1 cm long; calyx 4.5–7 mm long, green, 402 sparsely covered with short spreading hairs; corolla with exserted tube and large limb, apparently purple, the lip spotted; nutlets to 2 mm long, yellowish. July–September.

Stony mountain slopes, tragacanth groves. — Caucasus: E. Transc. (Borzhom district), S. Transc. (Lake Sevan, etc.). **Gen. distr.:** Arm.-Kurd. (vicinity of Artvin). Described from the vicinity of Borzhomi. Type in Leningrad.

15. *Z. denticulata* Juz. sp. n. in Addenda XX, 670. — *Z. clinopodioides* Rud. in Mém. Acad. Sc. Pétersb. II (1810) 311, non Lam. — *Z. clinopodioides*  $\beta$ . *denticulata* C. Koch in Linnaea, XVII (1845) 293. — ? *Z. odoratissima* Lodd. ex Sims, Bot. Mag. XXIII (1806) tab. 906, nomen in synonym. — *Z. clinopodioides*  $\alpha$ . *canescens* Ldb. Fl. Ross. III, 369, p. p., non Benth. — *Z. media* auct. nonnull. cauc.;



Grossg. Opred. rast. Kavk. 344, vix autem Link. — *Z. brantii* Grossh. Fl. Kavk. III (1932) 326 saltem p. p., non C. Koch. — Ic.: Rud. l. c. tab. XI (optima!); ? Bot. Mag. XXIII, tab. 906.

Subshrub of medium size, branched at base, apparently fragrant, 13–25 cm high; stems (primary branches) simple or branched, woody in lower part, shortly arched-ascending or suberect, slightly flexuous or nearly straight, rather stout and sturdy, somewhat rigid, more or less purple-tinged or almost green, covered (sparsely in lower part, more densely above) with short or moderately long hairs; leaves 8–20 mm long, 4–13 mm broad, pale green in dry state, somewhat coriaceous, fairly thin, glabrous on both sides or minutely pubescent on the midvein beneath, the lowest oblong, narrowed at base and at apex, the upper ovate or broad-ovate, broadest at or somewhat below the middle, undulately narrowed at base to petiole, acute or short-acuminate at apex, the lower entire, the upper obscurely and sparsely denticulate, often plicate, the uppermost long-ciliate at margin in lower half, with 4–5 lateral veins each side of midrib (these prominent in drying), obscurely punctate, the petiole short, 1–2 mm long, minutely puberulent; lower floral leaves shorter than the upper cauline but as broad, ovate to mostly very broadly ovate or suborbicular to obliquely orbicular (broader than long), acuminate and undulate-plicate at apex, subtending the head like an involucre and mostly spreading, the lower half of blade and the petiole long-ciliate; upper floral leaves abruptly smaller; lateral branches (when present) slender, subdivi-  
403 cate to suberect, shortish to fairly long, simple, bearing 1–2 pairs of leaves; inflorescences at ends of stems, compactly capitate, subspherical, rarely ovoid, 2–3 cm in diameter, the lateral reduced, mostly abortive; pedicels 1–3 (mostly 2) mm long; flowers 6–12 mm long; calyx 5–7 mm long, green or sometimes lilac-tinged, densely pubescent with short or very short hairs and sparsely covered in upper part (or only on the teeth) with subpatent or patent hairs; corolla mostly rather large, the tube exserted after anthesis, the stamens short; anthers mostly not exserted from throat of corolla; nutlets ca. 1.5 mm long, pale brown. June–July.

Stony mountain slopes, subalpine meadows. — Caucasus: E. Transc. (Karabakh, Lysogorsk), S. Transc. (Lori district of N. Armenia). Endemic. Described from the village Pushkino (form. Gerger). Type in Leningrad.

Note. This form has been known for a long time and has often been referred to *Z. media* Link; this name was recently adopted for it by Grossheim who had earlier placed it erroneously with *Z. brantii* C. Koch. However, the genuine *Z. media* had been presented without “patriae” indication and had apparently been described from cultivated specimens of unknown provenance. As mentioned earlier, the Siberian *Z. clinopodioides* Lam. s. str. was also presented as *Z. media*. It is also possible that, in actual fact, *Z. media* Link is merely a form of *Z. puschkinii* Adams devoid of the characteristic calyx indument (this, by the way, may have been lost in cultivation). In the light of these considerations, we have refrained from retaining Link's appellation for the plant under review.

16. *Z. woronowii* Maleev in Tr. Tifl. bot. inst. I (1934) 120; Kolak. Fl. Abkh. IV, 66. — Ic.: Kolak. op. cit. 69, Plate VII; Ter-Khachat. in Fl. Gruz. VII, Plate 327.

Subshrub; stems numerous, ascending, mostly flexuous, simple or branched, 15–25 cm high, suffused with pale purple, rather densely hairy, the hairs moderately long, horizontally spreading, straight or somewhat crisp; leaves large, 0.8–2 cm long, 0.5–1.5 cm broad, ovate to rounded-ovate, obscurely and distantly serrulate, light green, narrowed at base to petiole ca. 2 mm long, subobtusate or short-acuminate, the upper side with scattered spreading hairs, the lower side covered (mainly on the veins) with stiffish spreading hairs, obscurely glandular-punctate, with slightly prominent veins; lateral branches (when present) subdivaricate, long and slender; flower-heads ellipsoid or spherical, loose to fairly dense, 3–3.5 cm long, 2–2.5 cm broad, the lower whorls often remote; floral leaves resembling the upper cauline, long-ciliate at margin in lower  
404 part, often recurved; pedicels 1–3 mm long, minutely patent-hairy; calyx 6–8 mm long, pale green or pale purple, sparsely or rather densely hairy, the hairs horizontally spreading, shorter than calyx diameter; corolla ca. 1.5 mm long, pink, the tube exserted, the stamens long-exserted. July–August.

Over limestone in the alpine mountain zone. — Caucasus: W. Transc. Endemic. Described from Bzyb range, Mt. Yapskhu (above the sources of River Belaya), at an altitude of 1800 m. Endemic. Type in Leningrad.

Note. A distinctive plant, readily distinguishable from the preceding species, showing more affinity with *Z. denticulata* Juz. in calyx indument, and with *Z. raddei* Juz. in stem indument.

**Economic importance.** According to Kolakovskii, this plant contains essential oil and is of ornamental value, suitable for planting on stony hills.

17. *Z. puschkinii* Adams in Weber et Mohr, Beitr. z. Naturkunde, I (1805) 42; Grossg. in Tr. Tifl. bot sada, II, 1, 16, 19. — *Z. dasyantha* M. B. Fl. taur.-cauc. I (1808) 18; Benth. Lab. Gen. et sp. 321, p. p. — *Z. clinopodioides* γ. *dasyantha* Ldb. Fl. Ross. III (1846–1851) 369, p. p.; Boiss. Fl. or. IV, 586, p. p.; Shmal'g. Fl. II, 314. — *Z. subnivalis* Ter-Chatschat. ex Grossh. Opred. rast. Kavk. (1909) 377; Ter-Khachat. in Zam. po sist. i geogr. rast. Tbil. bot. inst. 16, 42. — Ic.: Bot. Mag. XXVII, tab. 1093; Ter-Khachat. in Fl. Gruz. VII, Plate 325 and 328 ("Z. subnivalis").

An almost inodorous or rather unpleasantly scented subshrub, woody at base, 4.5–30 cm high, branching from base; stems (primary branches) rather robust, numerous, prostrate or in upper part ascending, flexuous or strongly flexuous, nearly simple or more branched in turn, more or less rubescent or usually dark violet all the way up, mostly sparsely hairy, the hairs very short, recurved, more numerous near inflorescence, longer and softer, the internodes of medium length or the upper rather long; branches elongated, often reclinate or subdivaricate; leaves 3–15 mm long, 1.5–12 mm broad, ovate or rounded-ovate, orbicular or rhomboid-ovate, mostly broadest below the middle, often distinctly toothed in upper half, subobtusate or obtuse or (mainly the upper) short-acuminate or acuminate, somewhat coriaceous, thin, bright green, sometimes violet-rimmed, quite glabrous on both sides or with few minute teeth on the midrib beneath, short-attenuate at base or abruptly narrowed to  
405 petiole from rounded base, with 3–5 (mostly 4) veins each side of midrib, obscurely punctate, the petiole fairly long, channeled, often reddish, at least half the length of blade,

the base of blade and petiole long-ciliate; floral leaves mostly somewhat smaller than the upper cauline, mostly suborbicular or broadly rounded or broadly rhomboid, short-acuminate or acute, long-ciliate in lower part, covering the base of inflorescence, spreading or reflexed; inflorescence 1.2–2.5 cm in diameter, compactly capitate, spherical or ovoid, sometimes becoming oblong after anthesis, 1 or 2 lower verticillasters often distant, sometimes (especially the lowermost) very remote; heads on lateral branches sometimes half the size; pedicels to 1 mm (rarely 1.5) mm long; flowers (5) 6–10 mm long; calyx (4) 5–6 (7) mm long, green at apex or violet all over, densely lanate, the hairs white, soft, often implexed, long (at least some 2 (3) times diameter of calyx), very rarely short; corolla rather large, with scarcely exerted tube, bright rose-violet or purple-violet, whitish in throat, with a few violet spots; nutlets to 1.75 mm long, pale brown. June–August. (Plate XX, Figure 6.)

Stony slopes and screes in the subalpine zone of mountains. — Caucasus: Cisc., E. Transc. (Greater Caucasus), Dag. Endemic. Described from Osetia.

Note. We cannot acknowledge *Z. subnivalis* Ter-Chatschat. as an independent species. This is a problematic plant, collected on a single occasion on Mt. Fidar in S. Osetia, i. e. in locations where the typical *Z. puschkinii* Adams occurs. Most likely this is merely a depressed small-leaved form of *Z. puschkinii*, also noted for the absence of the characteristic long calyx hairs. Similar forms of *Z. puschkinii* Adams, with short-haired calyx, that sometimes occur in herbaria, originate mainly from the western part of the distribution area of the species.

**Economic importance.** Essential oil with a strong peppermint scent; output ranging between 0.33 and 0.46% (Grossheim).

Section 2. **Acinoideae** Benth. in DC. Prodr. XII (1848) 366. — Annuals with verticillasters tightly crowded at the end of stem and branches; anthers attached to filament below the middle or at base, the filament with a small tubercle but unappended.

All our species in this section belong to the series *Capitatae* Juz.

18. *Z. capitata* L. Sp. pl. (1753) 21; Ldb. Fl. Ross. III, 370; Shmal'g. Fl. II, 314. — *Z. compacta* Friv. in Flora (1835) 336. — *Z. glomerata* Friv. pl. exs. ex 406 Ldb. l. c. — *Z. capitata* 1) *angustifolia* et 2) *latifolia* Rud. in Mém. Acad. Sc. Pétersb. II (1810) 310. — Ic.: Sibth. et Sm. Fl. Gr. I, tab. 13; Rud. l. c. tab. X, fig. A et B. — Exs.: GRF, No. 523; Herb. Fl. Cauc. No. 188.

A low upright annual, 6–20 cm high; stem robust, simple or usually branched nearly from base; branches suberect or spreading, arcuately curved; stem and branches rather densely covered with short stiff recurved hairs; leaves in few distant pairs, 0.4–3.5 cm long, 1.5–7 mm broad, linear-lanceolate or lanceolate, narrowed at base to a fairly long petiole, subacute to acute, glabrous above or minutely hispiduous, scabrous on the veins beneath; floral leaves large to very large, rhomboid-ovate or suborbicular, broadly cuneate or almost rounded at base, abruptly narrowed to a short broad petiole, attenuate at apex and abruptly undulate-acuminate, the margin



densely ciliate with rather long spreading whitish hairs, both sides or only the lower covered with minute appressed hairs and with long bristly hairs; flowers 10–15 mm long; calyx 6–11 mm long, narrowly long-cylindrical, with spreading bristly hairs, the teeth short, linear-lanceolate, connivent; corolla-tube long and slender, exserted; anthers unappendaged; nutlets oblong-ovoid, to 1.5 mm long, dark brown, dull. May–August. (Plate XX, Figure 1.)

Dry stony slopes, steppes, derelict fields. — European part; Crim., L. Don; Caucasus: throughout; Centr. Asia: Mtn. Turkm. **Gen. distr.:** Bal.-As. Min., Iran. Described from Syria. Type in London.

**Economic importance.** Essential oil strongly peppermint-scented; output high: 0.8% (Grossheim).

19. *Z. capitellata* Juz. sp. n. in Addenda XX, 671.

A very low annual, often dwarf, 3–8 cm high; stem mostly simple, slender; leaves usually 1 pair, 3–7 mm long, 2–5 mm broad, ovate, elliptical or broad-ovate, on petiole 1–4 mm long; floral leaves 0.5–1.2 cm long, 0.2–0.9 cm broad, narrowly to broadly ovate, acute or short-acuminate, often arched-recurved; flowers 6–10 mm long; calyx 5–9 mm long; corolla-tube not exserted. Otherwise resembling *Z. capitata* L. May–June.

Gravelly mountain slopes. — Centr. Asia: T. Sh. (Karatau), Pam.-Al. (Gissar). Endemic. Described from the vicinity of Vannovskoe village (plants collected by N. Pavlov). Type in Leningrad.

- 407 Note. This dwarf (always?) plant can hardly be regarded as merely representing a non-authentic modification of *Z. capitata*, considering that its cauline leaves are broader and differently shaped, whereas its floral leaves are narrower. We have not observed anything comparable from the whole vast distribution area of *Z. capitata* L. Moreover, we are not aware of any specimens of *Z. capitata* from Soviet Central Asia (except Mtn. Turkm.).

Section 3. *Appendiculatae* Benth. in DC. Prodr. XII (1848) 366. — *Faldermannia* Trautv. in Bull. Acad. Sc. Pétersb. VI (1840) 185. — Annuals with more or less distant verticillasters; anthers attached to filament at base, with a small pendent basal appendage, this considered to be the reduced sterile second anther-locule (the appendage is absent in *Z. persica* Bge.).

20. *Z. taurica* M. B. Fl. taur.-cauc. I (1808) 414 et III (1819) 21; Ldb. Fl. Ross. III, 371. — *Z. tenuior*  $\beta$ . *taurica* Schmalh. Fl. II (1896) 314. — *Z. lanceolata* Boiss. Fl. or. IV (1879) 588 ex ips. (in synonym.). — *Faldermannia taurica* Trautv. in Bull. Acad. Sc. Pétersb. VI (1840) 185. — *Dracocephalum odoratissimum* Poir. Suppl. II (1811) 521. — *Thymbra spicata* Pall. Tabl. phys. et top. de Taur. (1796) 126, non L.; Georgi, Besch. d. Russ. R. III, 5, 1079. — **lc.:** Fedch. and Fler. Fl. Evrop. Ross. III, 826. — **Exs.:** Dörf. Herb. norm. No. 3446.

A rather low annual; stem simple or more often branched from base, rather slender, mostly reddish, 6–30 cm long; branches ascending, suberect or erect; stem and branches covered with scattered short curved retrorse hairs; leaves linear-lanceolate, narrowed at base and at apex, distinctly petiolate, prominently veined, roughened with scattered short hairs or subglabrous, the margin moderately long-ciliate; floral leaves resembling the cauline but subsessile, exceeding the calyx or the whole flower; verticillasters axillary, forming loose to fairly dense elongated spikelike inflorescence 2–16 cm long at ends of stems and branches; flowers 12–15 (17) mm long, short-pediceled or subsessile; calyx narrowly long-cylindrical, 5–7 mm long, covered with short stiff spreading hairs, the teeth short, triangular, connivent; corolla twice as long as calyx, the tube exserted, expanding into a large limb; anthers appendaged at base; a pair of short sterile staminodes often present; seeds ca. 1.3 mm long, narrowly ovoid, grayish-brown. May–August. (Plate XX, Figure 3.)

408 Dry rocky, gravelly and clayey slopes of mountains and hills, pebble beds. — European part: Crim. **Gen. distr.:** Bal.-As. Min. Described from Crimea. Type in Lenin-grad.

Note. It is possible that forms of this species from Asia Minor are not fully identical with *Z. taurica*. At least their verticillasters are usually more widely spaced than in the Crimean form.

21. *Z. tenuior* L. Sp. pl. (1753) 21; Ldb. Fl. Ross. III, 370; Shmal'g. Fl. II, 314; Kryl. Fl. Zap. Sib. IX, 2374. — *Z. tenuior*  $\beta$ . *gracilis* C. A. M. Enum. pl. cauc.-casp. (1831) 89. — *Faldermannia parviflora* Trautv. in Bull. Acad. Sc. Pétersb. VII (1840) 22. — *Ziziphora parviflora* Schost. in Bot. mat. gerb. Bot. inst. AN SSSR, VIII, 9 (1940) 156; Klovov in dr. Vozn. rosl. URSR, 423. — *Faldermannia tenuior* Nevski in sched.; Ter-Chatschat. in Zam. po sist. i geogr. rast. Tbil. Bot. Inst. 17 (1953) 75. — Exs.: Herb. Fl. Reip. Sov. Ucr. No. 88; HFAM, No. 225.

Annual, 5–20 (25) cm high; stem simple or branched, often branched from the root collar; branches short to fairly long, usually subdivaricate; stem and branches rather densely covered with short curved retrorse hairs, suffused with red in lower part or all over; leaves of the sterile part of stem usually few and distant, 0.7–2.5 cm long, 0.1–0.6 cm broad, linear-lanceolate or lanceolate, narrowed at base, mostly short-petioled, acute or long-acuminate, glabrous or scabrous, the upper softly or stiffly long-ciliate, marcescent; floral leaves resembling the cauline, greatly exceeding the flowers, the upper rarely as long as or shorter than calyx, short- or long-ciliate at least in the lower  $\frac{1}{2}$ – $\frac{3}{4}$ , prominently veined beneath, strictly upright to subdivaricate; verticillasters axillary, few- to moderately many-flowered, distant or the upper (sometimes all) subapproximate, often borne all along stem and branches; inflorescences loose to fairly dense, leafy, oblong or long-cylindrical, spikelike, 2–22 cm long; flowers 0.8–1 cm long, short-pediceled; calyx narrowly long-cylindrical, 0.5–0.75 cm long, covered with short or mostly fairly long stiffish spreading hairs, the teeth short, ovate-triangular, connivent; corolla-tube slender, slightly exserted; anthers small, usually with a small declined clavate appendage at base. May–August. (Plate XX, Figure 2.)

409 Stony and clayey rocks, sandy shores of rivers and seas, steppes, semideserts, often on cultivated soil. — European part: Bl., Crim., L. Don; Caucasus: E. and S. Transc.,

Tal.; W. Siberia: Irt.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., Mtn. Turkm., Syr D., Pam.-Al., T. Sh. Gen. distr.: Bal.-As. Min., Iran, Dzu.-Kash. Described from Syria. Type in London.

Note. Trautvetter referred some of the Caucasian material belonging to *Z. tenuior* to a different genus and presented it under the name *Faldermannia parviflora* Trautv. But the genus *Faldermannia* was based on inadequate and unstable characters (presence of appendage at base of anther, shape of corolla limb). The specific characters of *F. parviflora*, supposed to distinguish the plant from *Z. tenuior* (narrow leaves and absence of long hairs in the indument of the upper part of calyx) have also proved to be unstable and insignificant. Later authorities have therefore recognized *F. parviflora* Trautv. as a simple synonym of *Z. tenuior* L.

Nevertheless, an attempt was made at a later stage (see Bot. mat. gerb. Bot. inst. AN SSSR, VIII, 9, 1940) to subdivide the entity *Z. tenuior* s. l. into two distinct races: a Crimean and a Ukrainian-Caucasian, and the appellation *Z. parviflora* (Trautv.) Schost. was proposed for the latter. The Crimean race is said to have broader terminal (i. e. floral) leaves, the flowers of upper verticillasters equaling or even exceeding these leaves; the features supposed to characterize the Ukrainian-Caucasian race are narrower terminal leaves, greatly exceeding even the flowers of the uppermost verticillasters. However, examination of herbarium material has demonstrated that (a) the width of floral leaves varies greatly both in the Caucasus and in Crimea (also in Centr. Asia), the range of variation being much the same in either case (forms with very narrow floral leaves do in fact predominate in the Ukraine); (b) there is no correlation whatever between the width of floral leaves or the length of upper floral leaves and flower length; (c) as regards the length of upper floral leaves, forms that would have to be referred to "*Z. parviflora*" predominate in the Caucasus as well as in Central Asia and Asia Minor, while forms with terminal leaves as long as or shorter than the upper flowers occur much less frequently and side by side with the typical; (d) all the available material from Crimea does in fact belong to the short-leaved form, but considering the extreme scantiness and inadequacy of this material, one can hardly attach to it any decisive significance. It may be noted that the scantiness of material relating to the Crimean "*Z. tenuior* L." is due to the fact that much of it does in fact refer to *Z. persica* Bge. (see note to this species).

**Economic importance.** This species was apparently put to use before any other species of the genus; unfortunately, the limited supply makes collection difficult and renders utilization uneconomical. According to N. V. Pavlov, flowering plants contain 0.6–1.0% essential oil which consists mainly of pulegone (76–78%); see also: C. Wehmer, *Die Pflanzenstoffe*, II, 1931 1026.

- 410 22. *Z. persica* Bge. in Mém. Acad. Sc. Pétersb. VII sér. XXI, 1 (1873) 39; H. Braun in Verhandl. Zool.-bot. Ges. Wien, XXXIX, 222; Grossg. Fl. Kavk. III, 325. — *Z. persica* var. *robustior* Grossh. l. c. in synonym. — *Z. persica* var. *intermedia* M. Pop. in Sched. ad HFAM, IX (1926) 26. — *Z. persica* ssp. *eupersica* et ssp. *turkestanica* (cum var. *intermedia*) M. Pop. in sched. ad HFAM, X (1926) 20. — *Z. tenuior* C.A.M.



Pl. cauc.-casp. (1831) 89, non L. — *Faldermannia persica* Nevski in Tr. Bot. inst. AN SSSR, I, 4 (1937) 328, quoad nomen. — Ic.: Lam. Tabl. encycl. Bot. I, Rec. de pl. (1791) tab. 18, fig. 2 (nom. *Z. tenuior*). — Exs.: HFAM, No. 324.

A low or medium-sized annual; stem simple or branched, 5–30 cm long; branches (when present) mostly short, subdivaricate, borne in the middle part of the plant, rarely long and divaricately recurved, from plant base; stem and branches sparsely or rather densely covered with short spreading hairs, often faintly reddish, mostly robust; leaves in few more or less distant pairs, 0.7–4 cm long, 0.1–1 cm broad, the lowest ovate, the others lanceolate, narrowed at base and at apex, acute or long-acuminate, glabrous or scabrous at margin and on the midrib beneath, the uppermost often long-ciliate, rather stiff, prominently veined beneath, the lower petioles fairly long, the upper short; floral leaves resembling the cauline, the lower long-acuminate from somewhat enlarged ovate to narrowly ovate or broadly lanceolate base, greatly exceeding the flowers, sometimes (like the upper cauline leaves) with few sharp teeth, the others narrowly lanceolate, the upper very slightly exceeding the flowers, the uppermost usually as long or shorter, all patently long-ciliate, prominently veined beneath, the lateral veins arched; verticillasters mostly many-flowered, borne at ends of stems (and branches), closely approximate, forming a rather dense short ovoid spikelike inflorescence 1.5–11 cm long (very rarely the lower verticillasters distant); flowers 1–1.3 cm long, short- or long-pediceled; calyx narrowly long-cylindrical, 7–10 mm long (longer than in *Z. tenuior*), covered with longish or long patent stiff hairs, the teeth narrowly triangular or lanceolate, connivent; corolla ca. 9 mm long, the tube scarcely exerted; anthers mostly unappendaged, sometimes obsoletely appendaged, rarely with a well developed appendage (var. *intermedia* M. Pop.). May–July.

Dry stony, gravelly and clayey-pebbly slopes or bluffs, steppes (mainly wormwood), pebbles on shores of rivers and lakes, cultivated fields. — European part: Crim. (Simferopol area); Caucasus: S. Transc.; Centr. Asia: Mtn. Turkm., Pam.-Al. (Samarkand 411 province). **Gen. distr.:** Bal.-As. Min., Iran. Described from N. Azerbaidzhan (Khoi area, Shovits collections). Type in Leningrad.

**Note.** We were first to report this plant for Crimea; it was collected here in the vicinity of Simferopol by Dzevanovskii (“Dubki,” near the village Verkhnyaya Os’ma and the village Bek-Eli) and by Doich (in the Burgi village area) both in its typical form and as “*intermedia*” M. Pop.

*Z. persica* is very variable: inflorescence is either subcapitate or rather lax; floral leaves either very broad or relatively narrow, anther appendages lacking or (rarely) present. In our opinion, such variability fully confirms Popov’s assumption of its hybrid origin (the result of a *Z. capitata* × *A. tenuior* cross). The existence of this species tends to undermine the subdivision of the annual ziziphoras into two different sections.

The Central Asian subspecies *Z. persica* ssp. *turkestanica* M. Pop. is supposed to differ from the true *Z. persica* only in having lower and more slender stems. We have, however, seen Central Asian specimens with stout, robust stems and, on the other hand, specimens from Iran and from Transcaucasia with lower slender stems, so that we are not inclined to assign any taxonomic significance to these differences.

Flowers in few-flowered verticillasters in the axils of upper leaves; calyx campanulate, 13-nerved, bilabiate, straight, the upper lip almost flat, 3-toothed, the lower lip convex, 2-parted, with lanceolate teeth; corolla exserted, with curved tube, naked inside; upper lip emarginate, erect; lower lip 3-lobed, spreading, the middle lobe broader, cordate; stamens 4, curved under the upper lip; anthers divergent nearly at a right angle; nutlets ovoid, strongly narrowed at base, smooth. Perennials; stems quadrangular, glandular-hairy or covered only with simple soft hairs; leaves large, petiolate, ovate, crenate-serrate.

The genus contains three species distributed in the Mediterranean region.

1. *M. officinalis* L. Sp. pl. (1753) 592; Benth. Lab. Gen. et sp. 393; Ldb. Fl. Ross. III, 356; Boiss. Fl. or. IV, 584; M. B. Fl. taur.-cauc. II, 61; Pflanzenfam. IV, 295; 412 Shmal'g. Fl. II, 312; Grossg. Fl. Kavk. III, 327. — *M. taurica* hort. in Benth. l. c. 393. — Ic.: Fedch. and Fler. Fl. Evrop. Ross. Fig. 747; Pavlov, Dikie polezn. i tekhn. rast. Fig. 42. — Exs.: GRF, No. 430.

Perennial, 30–125 cm high, with soft short hairs all over; stems erect, branched, quadrangular; leaves petiolate, ovate, to 6 cm long, 3 cm broad, the upper cuneate, the lower cordate at base, crenate-toothed, subglabrous, sometimes with glandular hairs or punctate glands beneath; verticillasters 3–5–10-flowered, distant, in the axils of upper leaves; bracts elliptical or oblong, petiolate, not exceeding the flowers; calyx campanulate, hairy, the upper lip broad, flat, subemarginate, with 3 short acuminate teeth, the 2 lower teeth triangular-lanceolate; fruiting calyx 5-angled; corolla whitish or pinkish, 13–15 mm long, one-and-a-half times to twice as long as calyx, glabrate; upper lip almost flat; stamens 4, the lower longer, curved and connivent under the upper lip; nutlets ovoid, strongly narrowed toward base, brownish, smooth, 1.5–2 mm long, June–September. (Plate XXI, Figure 1.)

Cultivated for honey and for essential oil, often adventive and naturalized in weed-infested locations. In the Caucasus occurring in coppices and at wood margins. In Central Asia associated with walnut woods and damp shady ravines. — European part: U. Dnp., M. Dnp., Crim., L. V.; Caucasus: Cisc., W., E. and S. Transc., Tal.; Centr. Asia: T. Sh. (W.), Syr D., Pam.-Al., Mtn. Turkm. Gen. distr.: Centr. Eur., Med. (W. and E.), Bal.-As. Min., Arm.-Kurd., Iran. Described from Europe. Type in London.

Note. The plant displays wide variation in indument and leaf size. Both glandular-hairy and eglandular specimens occur. Plants from Turkmenia have larger leaves (var. *macrophylla* Boriss.).

**Economic importance.** Used medicinally as stimulant and mild laxative; provides nectar and nourishment for bees. Used in perfumery. Contains up to 150 mg% vitamin C. Used for flavoring food and as an ingredient of salads; it is also employed in the liqueur industry. The essential oil is highly valued. The leaves also contain tannin

\* Treatment by A. G. Borisova.

\*\* From Greek melissa, bee, as bees are attracted to the plant.

and tars. Oil obtained from Central Asian plants contains 55–60% citral and about 5% citronemeole. Balm has been cultivated since remote antiquity and it is mentioned in the writings of classical authors (Theophrastus, Dioscorides, Columella, Avicenna, etc.).

#### 413 Genus 1290.\* *Satureia*\*\* L.

L. Sp. pl. (1753) 567

Flowers 4–9 mm or 10–15 mm long, azure-white or pale lilac or pink; verticillasters 3–7-flowered, peduncled, in the leaf axils; calyx campanulate, 10–13-nerved, bilabiate or nearly regular, 5-toothed, with less deeply incised lower lip and few straight hairs in throat; corolla bilabiate, the upper lip erect, emarginate, the lower spreading, 3-lobed; stamens 4, connivent under upper lip, 2 of them longer than corolla or all exserted; anthers bilocular, the locules divergent, separated by a moderately broad connective; lobes of stigma divergent; nutlets globose to ovoid, obtuse. Annuals, subshrubs or shrubs, punctate-glandular mainly on leaves and calyx; leaves entire or nearly so, short-petioled.

About thirty species distributed mainly in the Mediterranean region.

1. Annuals, branched, short-haired; flowers small; all stamens shorter than corolla . . . . . 2.
- + Perennial herbs or subshrubs, woody from base; two stamens slightly longer than corolla or all four stamens prominently exserted . . . . . 5.
2. Peduncles slender, 5–15 mm long; flowers mostly solitary, rarely in 2's or 3's in the leaf axils, forming loose elongate inflorescences; calyx-teeth as long as or longer than the tube; corolla 8–10 mm long . . . . . 2. *S. laxiflora* C. Koch
- + Peduncles shorter; flowers (2) 3–5 in the leaf axil, forming fairly loose or dense inflorescences, or flowers sessile and then verticillasters capitate, compact, crowded in the upper part of branches, distant below; corolla 5–6 mm . . . . . 3.
3. Inflorescences compact, capitate in upper part of the plant, lower verticillasters distant; leaves obtuse, rather thick, narrowly oblong, densely punctate-glandular . . . . . 3. *S. pachyphylla* C. Koch
- + Inflorescences loose, racemiform; leaves lanceolate or linear, subacute, sparsely glandular . . . . . 4.
4. Branches long, appressed to stem, the internodes up to 5–9 cm long; leaves 1.5–3 cm long, lanceolate; petioles 5–6 mm long; calyx-teeth linear-lanceolate, abruptly dilated at base; corolla scarcely exserted, ca. 4 mm long . . . . .
- 414 . . . . . 4. *S. altaica* Boriss.
- + Plants divaricately branched from base; internodes not elongated; leaves linear or linear-lanceolate, 1.5–2.5 cm long; calyx-teeth linear; corolla exserted, ca. 6 mm long . . . . . 1. *S. hortensis* L.

\* Treatment by A. G. Borisova.

\*\* According to Pliny, derived from Latin *saturare*, to saturate, probably referring to the use of the plant in food.



5. All stamens and style prominently exserted; calyx 13-nerved; leaves narrow, oblanceolate-linear to subulate; inflorescence elongated, secund, many-flowered; stem two-sidedly hairy . . . . . 13. *S. spicigera* (C. Koch) Boiss.
- + Stamens not exserted or only two of them slightly exserted; plants differing in other characters . . . . . 6.
6. Leaves oblong-lanceolate to ovate-oblong, 1–4.5 cm long, 3–11 mm broad; calyx glabrous, the teeth subulate, one-and-a-half times as long as the tube (Abkhazia) . . . . . 11. *S. bzybica* Woron.
- + Plants different from above . . . . . 7.
7. Leaves obovate or obovate-spatulate, 8–10 mm long, subacute to obtuse, cuneate at base; calyx almost regular, the teeth subulate, acute, as long as the tube; corolla one-and-a-half times as long as calyx (Talysh) . . . . . 10. *S. intermedia* C. A. M.
- + Plants differing from above . . . . . 8.
8. Corolla twice to 3 times length of calyx, 10–15 mm long, the tube long, exserted (E. and S. Transc.) . . . . . 12. *S. macrantha* C. A. M.
- + Corolla one-and-a-half times as long as calyx, 7–9 mm long, the tube usually included in calyx . . . . . 9.
9. Leaves linear-lanceolate, spatulate, with a few shallow teeth in upper part, shining, acute; stems hairy; calyx sparsely short-pubescent at base, 4–4.5 mm long; corolla ca. 9 mm long (Dagestan) . . . . . 9. *S. subdentata* Boiss.
- + Leaves entire; plants differing from above . . . . . 10.
10. Calyx ca. 3 mm long, glabrous, the teeth one-quarter to one-third the length of the tube; corolla ca. 9 mm long; stems glabrous . . . . . 6. *S. taurica* Velen.
- + Calyx different; corolla 7–9 mm long; stems glabrous or hairy . . . . . 11.
11. Calyx hairy, the teeth half to nearly whole length of the tube; stems pubescent, paniculately branched; leaves punctate-glandular above . . . . . 5. *S. montana* L.
- + Calyx different; stems with virgate branches; leaves punctate-glandular on both sides . . . . . 12.
- 415 12. Calyx 5 mm long, crisp-haired, the teeth unequal, 1 and 2 mm long; stems canescent with short hairs . . . . . 7. *S. mutica* Fisch. et Mey.
- + Calyx 3–4 mm long, with few obsolescent hairs, the teeth half the length of the tube; stems glabrous . . . . . 8. *S. confinis* Boriss.

Section 1. *Sabbatia* Briq. in Pflanzenfam. IV, 3a (1897) 298. — Annuals, subshrubs and shrubs; leaves elongate, linear to lanceolate, spatulate and oblong; calyx bilabiate, 10-nerved; upper lip of corolla unequally lobed, mostly longer than the lower lip.

Series 1. *Annuae* Boriss. — Annuals; calyx 10-nerved, 3–5 mm long; corolla 4–10 mm long; stamens shorter than corolla.

1. *S. hortensis* L. Sp. pl. (1753) 568; Benth. in DC. Prodr. XII, 209; Benth. Lab. Gen. et sp. 352; M. B. Fl. taur.-cauc. II, 38, p. p.; Ldb. Fl. Ross. III, 349, p. p.;

Boiss. Fl. or. IV, 562. — *Clinopodium hortense* O. Ktze. Rev. gen. (1891) 515. — Ic.: Fedch. and Fler. Evrop. Ross. Fig. 748; Hegi, III. Fl. V, 4, tab. 230, fig. 4.

Annual; root slender, straight, subcylindrical, 10–15 cm long; stems 15–30 (45) cm long, covered with short recurved appressed hairs, branched from base, the branches spaced out; leaves linear to linear-lanceolate, 1.5–2.5 cm long, acute, sparsely glandular; flowers in 3–5-flowered axillary verticillasters, the upper sessile, the lower short-pedicelled, forming a rather loose elongate inflorescence; peduncles 0.3–0.6 mm long; calyx ca. 4 mm long, almost regular, hairy, the tube straight and regular, the linear teeth as long as or slightly shorter than the tube; corolla ca. 6 mm long, short-haired outside, pale lilac or pinkish, purple-spotted in throat; stamens usually shorter than the upper lip; anthers lilac; stamens sometimes abortive, with shorter filaments and whitish barren anthers; nutlets ovoid-trigonal, nearly smooth. July–October.

Dry gravelly and stony slopes, rocks, up to 1500 m above sea level. Grown in gardens, sometimes escaped and occurring as a weed. — European part: V.-Don, Bl., Crim.; Centr. Asia: Mtn. Turkm. (cultivated and naturalized), T. Sh. (cultivated); Pam.-Al. (Darvaz). Gen. distr.: S. and W. Europe. Described from Europe. Type in London.

Note. *S. hortensis* L. was described from cultivated specimens. It may be assumed that the seeds originated from European plants.

A closely related race, var. *manzhurica* Boriss., was found by Przheval'skii in the 416 Khanka Lake area. This is a strongly appressed-branched corymbiform plant with small flowers; verticillasters numerous, many-flowered; upper flowers subsessile; calyx-teeth lanceolate, ciliate.

**Economic importance.** The plant contains essential oil and has an agreeable scent. It is used as condiment for food flavoring. According to Kudryashev, one hectare of savory in Soviet Central Asia yields from 3 to 6 tons herbage and between 5 and 8 kg essential oil.

2. *S. laxiflora* C. Koch in Linnaea, XXI (1848) 668; Grossg. Opred. rast. Kavk. (1949) 344. — *S. hortensis* M. B. Fl. taur.-cauc. II (1808) 38. — *S. hortensis*  $\beta$ . *grandiflora* Boiss. Fl. or. IV (1879) 562. — *S. hortensis* var. *laxiflora* (C. Koch) Grossh. Fl. Kavk. III (1932) 327. — Exs.: Herb. Fl. Cauc. No. 529; Pl. or. exs. No. 146.

A slender, sparingly and loosely branched annual, 10–15 (20) cm high; leaves narrow, sublinear to suboblong; verticillasters in the leaf axils, 1–2 (3)-flowered, on slender peduncles 5–15 mm long, more often 0.5–0.8 cm; upper flowers subsessile, the lower on pedicels ca. 0.5 cm long; calyx infundibular at first, becoming campanulate, 3 mm long, covered with short stiff hairs, the lance-subulate ciliate teeth as long as or longer than the tube; corolla 8–10 mm long, pubescent, the tube exerted, the lower lip 3-lobed, the upper shorter lip 2-lobed; two stamens as long as the lower lip, two shorter; nutlets rounded-ovoid, 1 mm long, 0.5 mm broad, fuscous, with 4 black divergent nerves. June–October.

Stony slopes, shale taluses, marlaceous limestone, at altitudes from 150 to 1700 m. — Caucasus: Cisc., W. E. and S. Transc., Dag., Tal. Gen. distr.: Arm.-Kurd., Bal.-As. Min., Iran. Described from Georgia. Type in Berlin.



PLATE XXI. 1 – *Melissa officinalis* L., upper part of stem, calyx unfolded, corolla unfolded, nutlet; 2 – *Micromeria serpyllifolia* (M.B.) Boiss., general aspect, calyx, nutlet, stigma, corolla unfolded; 3 – *Amaracus rotundifolius* (Boiss.) Briq., general aspect, calyx, corolla unfolded, style, nutlet.



Note. The plant yields 0.1% essential oil which is used for flavoring liqueurs and brandies. The aromatic leaves are used in fresh condition as seasoning. The plant is valuable for its late nectar flow; it gives aromatic honey with a characteristic spicy flavor. The plant contains tannin.

3. *S. pachyphylla* C. Koch in Linnaea, XVII (1843) 295; Benth. in DC. Prodr. XII, 210. — *S. litwinowii* Schmalh. ex Lipsky, Fl. Kavk. (1899) 108.

- 419 Annual; stems divaricately branched, crisp-haired in upper part; leaves glabrous, rather thick, densely punctate-glandular, narrowly oblong, obtuse; verticillasters 2–3-flowered, subsessile, in the leaf axils, the lower distant, the upper crowded, forming a compact capitate inflorescence; calyx ca. 3 mm long, elongating in fruit to 5 mm, campanulate, at first hairy, at length with few hairs on the ribs, the teeth lanceolate, acute, subequal, ca. 2 mm long, ciliate; corolla small, 4–5 mm long, hairy outside; middle lobe of lower lip large, exceeding the others by nearly 1 mm; nutlets oblong, grayish-black. July.

Steppes, cultivated and naturalized. — European part: L. Don, U. Dnp., V.-Don, Bl., B.-Kama; Caucasus: Cisc. Endemic. Described from Don steppes. Type in Berlin.

Note. Closely resembling *S. hortensis* L. and perhaps identical. It is characterized by more compact sessile inflorescences and larger leaves. It is possible that this is a naturalized form that has become modified in cultivation. In Koch's description the plant is mistakenly presented as a shrub.

4. *S. altaica* Boriss. in Bot. mat. gerb. Bot. inst. AN SSSR, XV (1953) 326. — *S. hortensis* Ldb. Fl. Ross. III (1846–1851) 349, p. p. non L.; Bge. in Ldb. Fl. alt. II, 397; Kryl. Fl. Zap. Sib. IX 2377.

Annual; root slender; stems 20–35 cm high, slender, sparsely covered with short stiff retrorse hairs, erect, the internodes 5–9 cm long; branches more or less appressed, the lower longest; leaves lanceolate, 1.5–3 cm long, 3–8 mm broad, subacute, smooth, sparsely glandular, the petiole 5–6 mm long; verticillasters axillary, distant, 2–4-flowered (or flowers solitary), the lower on peduncles 5–8 mm long, the uppermost subsessile, forming a loose racemiform inflorescence; lower flowers long-pediceled; bracts linear-lanceolate to filiform, sparsely hispid; calyx campanulate, 10-nerved, ca. 4 mm long, subglabrous, punctate-glandular, the teeth subulate, dilated at base, ciliate, 2–2.5 mm long; corolla scarcely exserted, ca. 4 mm long, with sparse short hairs outside, pale lilac, broadly infundibular, with a short tube; lower lip 3-lobed, the lobes rounded, the middle lobe larger; upper lip with a single rounded emarginate lobe; stamens not exserted. July.

Coniform peaks. — W. Siberia: Alt. (vicinity of Zmeinogorsk). Endemic. Described from the location indicated. Type in Leningrad.

- 420 Note. This may be an escape from cultivation. Features distinguishing it from the closely related *S. hortensis* L. s. str., a species widely cultivated in Europe, include: elongated branches, closely appressed to stem (not spreading); internodes to 5–9 cm long; longer petioles; smaller, barely exserted flowers, 4 mm (not 6 mm) long; linear-lanceolate (not lanceolate) calyx-teeth.

Series 2. *Montanae* Boriss. — Subshrubs; calyx 3–4.5 mm long, 10-nerved; corolla 7–10 mm long; stamens about as long as corolla, often two of them slightly exserted.

5. *S. montana* L. Sp. pl. (1753) 568; M. B. Fl. taur.-cauc. II, 37; Benth. in DC. Prodr. XII, 209; Benth. Lab. Gen. et sp. 353; Boiss. Fl. or. III, 563; Shmal'g. Fl. II, 309; Fedch. and Fler. Fl. Evrop. Ross. 828; Grossg. Fl. Kavk. III, 328. — *Micromeria montana* Rchb. Fl. Germ. exc. (1831) 311. — *Saturiastrum montanum* Four. in Ann. Soc. Linn. Lyon N. S. XVII (1869) 133. — Ic.: Sibth. et Sm. Fl. Gr. tab. 543.

Subshrub, 20–40 cm high; stems erect, 4-angled or subterete, with light-colored bark, densely leafy, paniculately branched in upper part, glabrous or scabrous; leaves oblanceolate or linear-lanceolate, to 3 cm long, entire, acuminate, gradually narrowed toward base, coriaceous, glabrous, punctate-glandular above, scabrous and ciliate-margined; upper leaves equaling the flowers; bracts ovate or lanceolate; verticillasters 3–7-flowered, gathered in upper part of stem into a paniculate subsecund inflorescence; flowers short-pedicel; calyx briefly tubular-infundibular, pubescent at base, with sparse hairs in throat, the teeth subequal, subulate, acuminate, about as long as the tube; corolla to 11 mm long, exceeding the calyx, whitish, the upper lip pink, the throat and base of lower lip purple-spotted; upper lip emarginate; lower lip spreading, unequally 3-lobed; stamens not exserted; nutlets rounded-ovoid, 1–1.3 mm long, light brown, punctulate. June–August.

Only in cultivation and escaped. — Centr. Asia: Syr D. (Tashkent, Chimgan). Gen. distr.: S. Eur., Med. Described from Italy. Type in London.

6. *S. taurica* Velen. in Sitzb. Böhm. Ges. Wiss. (1903) 9. — *S. cuneifolia* Leveillé in Demid. Voy. dans la Russ. mer. II, 178 (non Tenore). *S. montana* M. B. Fl. taur.-cauc. II (1808) 37, non L. — ? *S. variegata* Host ex Stank. and Tal. Opred. rast. (1949) 421 843. — *Hyssopus angustifolius* M. B. Fl. taur.-cauc. II (1808) 38, p. p.; Stank. and Tal. op. cit. 844. — Exs.: Dörf. Herb. norm. No. 4290.

Subshrub, differing from *S. montana* L. in its leaves being firm, more coriaceous, glandular on both sides, glabrous except for ciliate margin in lower part; stems naked, sparingly branched; inflorescence erect, narrow, elongated; bracts and bracteoles narrowly linear; calyx 3 mm long, strongly glandular, glabrous, with sparse hairs in throat, the teeth lanceolate, ca. 1 mm long, one-quarter to one-third length of tube; corolla ca. 9 mm long, with long tube and sparse hairs on lower lip, faintly reddish; middle lobe of lower lip broader and longer than the lateral lobes; upper lip emarginate; two of the stamens nearly as long as corolla, the other two shorter; nutlets oblong, ca. 1.5 mm long, 0.75 mm broad, slightly dilated at apex, obtuse, glabrous, light brown, 3-nerved on the back, sharply ribbed ventrally at juncture with other nutlets. June–August.

Limestone, rocks, stony soils. — European part: Crim. Described from Crimea. Type in Prague?

7. *S. mutica* Fisch. et Mey. in Ind. sem. hort. Petrop. II (1835) 49 et 11 (1846) 68; Hohen. in Bull. Soc. Nat. Mosc. III, 298; Boiss. Fl. or. IV, 565; Ldb. Fl. Ross.

III, 10; Grossg. Fl. Kavk. III, 329. — *S. intermedia* Benth. in DC. Prodr. XII, 210, ex parte, non C. A. M.

Subshrub, canescent with short stiff hairs; stems numerous, 30–50 cm high, erect, woody and strongly branched only at base, the branches slender, virgate; leaves oblong-lanceolate or linear, gradually narrowed toward base, subobtuse to subacute at apex, the upper equaling the flowers, glabrous, pale green, punctate-glandular; inflorescences axillary, loosely racemose, few-flowered; verticillasters mostly 3-flowered, short-peduncled; bracts linear, very much shorter than calyx; calyx bilabiate, 5 mm long, punctate-glandular, covered with short stiff upcurved hairs, the teeth sublinear, obtuse, unequal, shorter than the tube, three of them ca. 1 mm and two ca. 2 mm long; corolla ca. 7 mm long, pubescent, punctate-glandular in upper part; lower lip 3-lobed, the lobes subequal, ovate; upper lip emarginate; two of the stamens exceeding the corolla, two shorter; style exserted; nutlets ovoid, obtuse at apex, 1–1.5 mm long and 1 mm broad, with distinct simple nerves on the back, fuscous-brown. June–August.

Dry stony slopes in the middle mountain zone. — Caucasus: Tal.; Centr. Asia: Mtn. Turkm. (Sulyukli). **Gen. distr.:** Iran. Described from Talysh. Type in Leningrad.

422 **Note.** In specimens from Turkmenia, corolla is 8–10 mm long; calyx 3–4 mm long, with three short teeth, the other two 2 mm long. *S. mutica* Fisch. et Mey. differs from *S. montana* L. in the obtuse calyx-teeth, leaf shape, and other characters; it is distinguishable from *S. intermedia* C. A. M. by elongated erect stems, narrow leaves, small bracts, and shorter calyx-teeth.

**Economic importance.** *S. mutica* Fisch. et Mey. yields 0.53% agreeably scented oil; it is used for flavoring food (Grossheim).

8. *S. confinis* Boriss. in Bot. mat. gerb. Bot. inst. AN SSSR, XV (1953) 325. — *S. montana* auct. Fl. Cauc. non L.

Subshrub, 20–35 cm high; stems branched from base, glabrous, sometimes sparsely covered at first with very short hairs, 4-angled, sulcate; branches slender, virgate; leaves glabrous, glaucescent, densely punctate-glandular on both sides, entire, linear-lanceolate, acute, gradually narrowed toward base, the lower 15–20 mm long, 2–3 mm broad, the upper to 10 mm long; verticillasters 3–4-flowered, axillary, on peduncles 5–7 mm long, forming long narrow racemiform inflorescences; bracts linear, acute, not exceeding the calyx; calyx 3–4 mm long, glabrous, rarely with few minute hairs, punctate-glandular, 10-nerved, with sparse hairs in throat, the teeth subulate-linear, acute, about half the length of the tube; corolla 7–8 mm long, bilabiate, pubescent outside; lower lip 3-lobed, the middle lobe the largest; upper lip scarcely emarginate, slightly shorter; two of the stamens exceeding the corolla; nutlets ovoid, grayish-brown, ca. 1.5 mm long, less than 1 mm broad, with 3 dorsal nerves reaching the middle. May.

Stony slopes, at about 1500 m above sea level. — Caucasus: Tal. (Dyman station). **Gen. distr.:** Iran. Described from Lenkoran area. Type in Leningrad.

**Note.** This species has been confounded with *S. montana* L. It differs in having glabrous stems (faintly pubescent only when young); leaves to 2 cm long, glandular on both sides (not only above), glabrous or subglabrous calyx with shorter teeth, not the length, but half the length of the tube.



Series 3. *Spathulatae* Boriss. — Shrubs and subshrubs with spatulate leaves ranging from linear-lanceolate to obovate; calyx 10-nerved, 4–4.5 mm long; corolla one-and-a-half times as long as calyx; stamens not exerted.

9. *S. subdentata* Boiss. Fl. or. IV (1879) 565; Grossg. Fl. Kavk. III, 329. — *S. gu-nibica* Woron. in Tr. Bot. inst. I, 1 (1933) 222. — *S. montana* auct. fl. Cauc. non L.
- 423 Shrublet, 20–25 cm high; stems woody and strongly branched at base, flexuous, with sparse short hairs; branches slender, ascending, mostly simple; leaves green, shining, glabrous, rather thick, 8–15 mm long, 2–4 mm broad in upper part, oblong or linear-lanceolate, spatulate, shallowly sinuate-dentate in upper part, gradually cuneate-attenuate to a short petiole, often conduplicate, sometimes fascicled in the leaf axils; verticillasters 3 (4)-flowered, on slender erect peduncles in the leaf axils; bracts linear-spatulate, acuminate, conduplicate, equaling the calyx; calyx 4–4.5 mm long, with sparse short hairs at base, with short bristly upcurved hairs on the ribs, naked or sparsely haired in throat, the teeth obtusish and recurved, the upper lanceolate, short, the lower longer, linear-lanceolate, acuminate, shorter than the tube; corolla ca. 9 mm long, ( $1\frac{1}{2}$ ) 2–2½ times as long as calyx, pink, sparsely glandular, the tube included in calyx; lower lip unequally lobed, longer than the emarginate upper lip; stamens not exerted; nutlets oblong, ca. 1.5 mm long, 0.75 mm broad, with slightly prominent nerves, smooth, obtuse at apex, yellowish. June–August.

Rocks and upper slopes in the middle mountain zone, at altitudes between 1000 and 2000 m. — Caucasus: Dag. Endemic. Described from Dagestan. Type in Geneva; cotype in Leningrad.

10. *S. intermedia* C. A. M. Verzeichn. d. Pfl. (1831) 91; Ldb. Fl. Ross. III, 349; Benth. in DC. Prodr. XII, 210 et Lab. Gen. et sp. 355; Boiss. Fl. or. IV, 564; Grossg. Fl. Kavk. III, 328.

- Subshrub, 15–22 cm high, grayish all over with a dense cover of short stiff patent hairs, strongly branched, woody at base; branches slender, divaricate, often decumbent and ascending; leaves obovate, ovate-oblong or ovate-spatulate, the lower 8–10 mm long, subacute to subobtuse, cuneately narrowed at base, sparsely dentate, densely punctate-glandular, slightly exceeding the flowers; verticillasters 3–5-flowered in the leaf axils, forming a loose racemose inflorescence at ends of branches; flowers distinctly short-pedicelled; bracts sublinear, curved, shorter than calyx; calyx slightly bilabiate, punctate-glandular, hispid on the ribs, the teeth subulate, slightly recurved, subacute, as long as the tube; corolla pink, one-and-a-half times as long as calyx, the tube in-
- 424 cluded; lower lip slightly longer than the upper, 3-lobed; stamens shorter than corolla; nutlets oblong, 1.5–1.75 mm long and ca. 1 mm broad, smooth, brown, with branched nerves. June–August. (Plate XXII, Figure 1.)

Dry gravelly and stony slopes, rocks, at altitudes between 1500 and 1800 m. — Caucasus: Tal. Endemic. Described from Talysh. Type in Leningrad.

Note. Yields 0.26% of oil with strong pleasant aroma.

Series 4. *Cuspidatae* Boriss. — Shrublets with large coriaceous leaves; calyx 8–9 mm long, not much shorter than corolla, the teeth long, subulate, nearly as long as the tube.

11. *S. bzybica* Woron. in Tr. Bot. inst. AN SSSR, I, 1 (1933) 222. — *S. illyrica* Grossh. Fl. Kavk. III (1932) 328, non Host.

Shrub 20–40 cm high, with a strong branched root; stems numerous, branched, pubescent when young, at length glabrescent, almost 4-angled, densely leafy; branches mostly ascending; leaves opposite, mostly oblong-lanceolate or oblong to ovate-oblong, 1–4.5 cm long, 3–11 mm broad, cuneate at base, subsessile, sparsely ciliate at margin, sparingly serrate-dentate, acuminate and spinous-tipped, firm, coriaceous, shining, punctate-glandular on both sides; upper leaves equaling the calyx but shorter than corolla; verticillasters 3–6-flowered in the leaf axils; bracts linear or linear-subulate, 8–10 mm long, often carinately folded; peduncles and pedicels densely glandular, with few exserted hairs in throat, the teeth subulate, erect, unequal, about as long as to one-and-a-half times as long as the tube; corolla violet, sparsely haired, slightly exceeding the calyx; nutlets ca. 1.5 mm long, 1 mm broad, ovoid, obtuse at apex, fuscous, sharply keeled on one side, 3-nerved on the other, minutely glandular-tuberculate. July–September.

Dry calcareous rocks in the lower mountain zone. — Caucasus: W. Transc. (Abkhazia). Endemic. Described from River Bzyb'. Type in Leningrad.

Note. Closely related to *S. illyrica* Host., but the leaves of *S. illyrica* are linear-lanceolate, narrower, with glands confined to lower side, ciliate at margin but not serrate-dentate; flowers are in short dense inflorescences. The calyx of *S. illyrica* is campanulate-tubular, usually colored, with aristate teeth; the nutlets are puncticulate.

425 Series 5. *Macranthae* Boriss. — Subshrubs; calyx ca. 5 mm long, 13-nerved; corolla 10–15 mm long; two stamens slightly exserted.

12. *S. macrantha* C. A. M. in Ind. sem. hort. Petrop. XI (1831) 67; Boiss. Fl. or. IV, 566; Grossg. Fl. Kavk. III, 328. — Exs.: Pl. or. exs. No. 347.

Subshrub, 30–50 cm high, woody at base; stems often numerous, rough, gray; branches rather thick linear-spatulate to oblong-spatulate, 8–10 mm long, mostly somewhat spreading, obtusish, whorled; verticillasters axillary, 1–3-flowered, distant, forming an elongated loose spikelike inflorescence; calyx tubular-campanulate, covered with scattered short hairs, ca. 5 mm long, almost bilabiate, sparsely haired in throat, the teeth subulate, [the upper] one-third the length of the tube, the lower two one-and-a-half times as long; corolla 2–3 times as long as calyx, 10–15 mm long, pink, the tube long, narrow, greatly exceeding the calyx; lower lip with three subequal lobes; upper lip somewhat shorter, emarginate; two stamens and style slightly exserted; nutlets fuscous, ovoid, ca. 1.5 mm long, 0.75 mm broad. Fl. June–September; fr. October.

Rocks in the middle mountain zone, on stony limestone slopes, at altitudes between 1000 and 1800 m. — Caucasus: E. and S. Transc. **Gen. distr.:** N. Iran. Described from Transcaucasia. Type in Leningrad.

Note. Specimens from Yerevan area (Igdyr') are distinguished by broader short-ovate leaves, longer calyx-teeth and larger flowers (var. *erevanica* Boriss.).

**Economic importance.** Used fresh as condiment. The plant contains phenols and is undoubtedly of interest.

Series 6. *Hyssopiflorae* Boriss. — Perennials; calyx 13-nerved, much shorter than corolla; corolla 8–10 mm long; all stamens exserted; inflorescences spikelike, one-sided.

13. *S. spicigera* (C. Koch) Boiss. Fl. or. IV (1879) 566; Grossg. Fl. Kavk. III, 329. — *Micromeria spicigera* C. Koch in Linnaea, XVII (1843) 295; Ldb. Fl. Ross. III, 350. — *Satureja intermedia*  $\beta$ . *laxior* Benth. in DC. Prodr. XII (1848) 210. — *S. alternipilosa* C. Koch in Linnaea, XXI (1848) 668. — *Micromeria alternipilosa* C. Koch in Linnaea, XIX (1847) 25.

Perennial, with erect, virgate stems, branched from base; branches divaricate, slender, densely leafy, sparsely pubescent on two sides; leaves bright green, narrow, oblanceolate-linear or linear to subulate, somewhat curved, the upper approximate, the terminal equaling the flowers, punctate-glandular; inflorescences at ends of branches, rather dense, one-sided, cylindrical, spikelike; verticillasters axillary, 3–4-flowered, sessile; peduncles 2–5 mm long; bracts small; calyx campanulate, bilabiate, subglabrous, with few long hairs in throat, the teeth lanceolate, subobtuse, glabrous, ciliate, two teeth nearly as long as the tube, the other three one-quarter length of tube; corolla white or pink, with a broad unequally 3-lobed limb, slightly exceeding the calyx, 8–10 mm long; stamens and style exserted; nutlets subglobose, flattened, grayish-black, with colored areola. July–September. (Plate XXII, Figure 3.)

Lower and middle parts of the forest zone, on rocky and gravelly slopes, in coppices and scrub. — Caucasus: Cisc., Dag., W., E. (W. Georgia) and S. Transc., Tal. **Gen. distr.:** Arm.-Kurd., Iran. Described from the Caucasus (Radzha). Type in Berlin; co-type in Leningrad.

Note. A spicy plant, cultivated in Kolkhida and Adzharia. Studies conducted by T.A. Kezeli show that the leaves of *S. spicigera* are much richer in essential oil and vitamins than those of *S. hortensis*. The secreted oil forms droplets in the leaf mesophyll, large round drops being deposited in specialized vessels.

Genus 1291.\* *Micromeria*\*\* Benth.

Benth. Lab. Gen. et sp. (1832–1836) 368

Inflorescence a small panicle; flowers small, purple, lilac or white; calyx tubular or tubular-campanulate, regular, straight, equally 5-toothed, 15-nerved, hairy in throat;

\* Treatment by A. G. Borisova.

\*\* From Greek *micros*, small, and *meros*, part; probably referring to the small flowers.



corolla bilabiate, with flat upper and 3-lobed lower lip; tube of corolla straight, naked inside; stamens 4, ascending under upper lip of corolla, not exerted; nutlets oblong, mostly dark brown, 1 mm long, 0.5 mm broad. Perennials and subshrubs.

About 130 species, distributed in the Mediterranean region.

1. Leaves short-pediceled, ovate or oblong-ovate; plants grayish with dense appressed pubescence, 15–60 cm high . . . . . 2.
- 427 + Leaves sessile; green plants, subglabrous or roughened with short hairs, 5–15 cm high (W. Transc.) . . . . . 3.
2. Inflorescence paniculate, open; flowers long-pediceled; bracts linear; calyx 2.5–3 mm long, with small broad teeth; plants 15–30 cm high (Crimea) . . . . . 1. *M. serpyllifolia* (M. B.) Boiss.
- + Inflorescence paniculate, not open, the branches appressed to the axis; flowers short-pediceled; bracts ovate; calyx 1.5–2 mm long, with small lanceolate teeth (W. Transc.) . . . . . 2. *M. marifolia* (Willd.) Benth.
3. Stems simple, 8–15 cm high, subglabrous, somewhat rough, green; corolla barely exceeding the tubular-campanulate calyx . . . . . 4. *M. elliptica* C. Koch
- + Stems branched from base, 5–9 cm long, scaberulous; green plants; corolla 1½ to 3 times as long as the tubular calyx (Artvin Distr.) . . . . . 3. *M. elegans* Boriss.

Series 1. *Serpyllifoliae* Boriss. — Leaves petiolate; inflorescence paniculate; verticillasters axillary, many-flowered; gray-tomentose plants with short appressed hairs.

1. *M. serpyllifolia* (M. B.) Boiss. Diagn. ser. 2, IV (1859) 13 et Fl. or. IV (1879) 574; Shmal'g. II, 310; Grossg. Fl. Kavk. III, 330. — *Nepeta serpyllifolia* M. B. Fl. taur.-cauc. II (1808) 40. — *Micromeria marifolia* Benth. Lab. Gen. et sp. (1832–1836) 382, p. p.; Ldb. Fl. Ross. III, 351. — *Satureja serpyllifolia* Briq. in Pflanzenfam. IV (1897) 301; Fedch. and Fler. Fl. Evrop. Ross. 828. — Ic.: Rchb. Ic. bot. 3, tab. 219; M. B. Cent. pl. 1, tab. 28.

Perennial, with strong branched roots; stems numerous, 15–30 cm high, slender, erect, gray-tomentose with fine appressed hairs, silky, in upper part paniculately branched; leaves short-petioled, oblong-ovate to ovate, entire or obscurely sinuate-dentate; inflorescence paniculately branched; verticillasters many-flowered, forked; flowers on long slender pedicels; bracts small, linear; calyx tubular-campanulate, 2.5–3 mm long, the small broadly triangular teeth one-sixth the length of the tube; corolla pale lilac, with darker spots, 3 times as long as calyx; upper lip of corolla short, emarginate; lower lip longer, with broader middle lobe; anther-locules divergent; stamens shorter than corolla, unequal; nutlets glandular-pubescent from apex to nearly the middle, oblong, 1 mm long, 0.5 mm broad, dark brown. June–August. (Plate XXI, Figure 2.)

Rocks, chalky mountains. — European part: Crimea (S.W.). Endemic. Described from Inkerman. Type in Leningrad.

428 2. **M. marifolia** (Willd.) Benth. Lab. Gen. et sp. (1832–1836) 382, quoad pl. arm. et in DC. Prodr. XII (1848), 224, p. p. — *Thymus marifolius* Willd. Enum. pl. hort. Berol. II (1809) 624. — *Melissa fruticosa* L. Sp. pl. (1753) 593 p. p. — *M. marifolia* Pers. Syn. 2 (1807) 132. — *Nepeta marifolia* Cav. Ic. rar. VI, 55 (1801) tab. 576.

Perennial; roots strong, woody; plant grayish all over with fine compact appressed pubescence; stems numerous, erect or ascending, 20–60 cm high, branched from base; leaves short-petioled, ovate or oblong-ovate, obtuse, almost entire, the upper subacute, gray above, whitish beneath, cuneate at base; inflorescences paniculate, contracted, rather loose, dichotomously branched, in the axils of opposite leaves; pedicels very short; bracts small, ovate, short-haired; calyx campanulate, 1.5–2 mm long, densely short-pubescent, with hairs in throat equaling the teeth, these small, lanceolate, one-eighth to one-sixth the length of the tube; corolla twice to 3 times as long as calyx; all stamens in throat of corolla, two of them shorter than the others; style exserted. July–August.

Mountain slopes. Possibly growing in S. Transc. Known from former Artvin district, whence described. **Gen. distr.:** E. Anatolia. Type in London.

Note. This species has been placed by many authorities among synonyms of *M. serpyllifolia* (M.B.) Boiss. described from the Crimea. These species are similar in habit and undoubtedly related, but they differ clearly in calyx size, shape of calyx-teeth, shape of inflorescence, and distribution.

Series 2. *Ellipticae* Boiss. — Leaves sessile; flowers 1–3 in the leaf axils, forming loose spikelike inflorescences; plants almost glabrous or rough with short hairs.

3. **M. elegans** Boriss. in Bot. mat. gerb. Bot. inst. AN SSSR, XV (1953) 330. — *M. elliptica* Grossh. Fl. Kavk. III (1932) 330, non C. Koch.

429 Subshrub; roots woody, strongly branched; stems numerous, 5–9 cm high, slender, branched from base, ascending or erect, short-pubescent, green; leaves sessile, the upper linear-lanceolate to oblong, the lower often ovate or broad-ovate, subacute, revolute-margined, entire, punctate-glandular, prominently veined beneath, the lower with sparse short hairs; 1–3-flowered in the leaf axils, on peduncles shorter than leaves, crowded at ends of stems into loose spikelike inflorescences; pedicels 1–2 mm long; bracts linear, ca. 1.5 mm long, scabrous; calyx straight, tubular, prominently 15-nerved, 3–4 mm long, with sparse short hairs and punctate-glandular, often violet-tinged, the hairs in throat straight, bristlelike, nearly equaling the teeth; teeth lanceolate, ca. 0.5 mm long; corolla 10 mm long, bilabiate, pubescent above, sparsely glandular; upper lip deeply emarginate; lower lip larger, 3-lobed, the lobes deeply dissected, the middle lobe reniform, the lateral lobes rounded; stamens 4, of these two reaching the throat of corolla, the other two shorter; anthers divergent, separated by a broad connective; style short, as long as the stamens. May–June.

Stony slopes of ravines, rocks. Possibly occurring in S. Trans., as it is known from the former Artvin district. Described from Gurzhana. Type in Leningrad.

Note. Distinguishable from *M. elliptica* C. Koch by sparser indument, stem branching from base, shape and indument of leaves, shape and size of calyx, corolla and bracts.

4. *M. elliptica* C. Koch in *Linnaea*, XXI (1848) 669; Grossg. *Fl. Kavk.* III, 330. — *Satureja kochii* N. Pop. nomen from Grossg. op. cit. — *Micromeria pubescens* Boiss. et Kotschy ex Boiss. *Fl. or.* IV (1879) 571.

Subshrub, almost glabrous or slightly scabrous; roots woody, green; stems numerous, slender, ascending or erect, simple, 8–15 cm high; leaves subsessile, the upper linear-oblong, the lower oblong to ovate-oblong or ovate, revolute-margined, subobtusate, exceeding the flowers; verticillasters 1–3-flowered, short-peduncled, crowded at ends of stems into a short loose racemiform inflorescence; calyx straight, tubular-campulanate, colored, hairy in throat, the obtusish lanceolate teeth one-sixth to one-quarter the length of the tube; corolla barely exserted; nutlets ellipsoid, acute. June.

Dry stony slopes, at altitudes between 1400 and 2000 m. Possibly occurring in W. and S. Transc., as it is known from the former Artvin district. Described from E. Anatolia. Type in Berlin.

# Genus 1292.\* *Calamintha*\*\* Lam.

Lam. *Fl. Franc.* II (1778) 393, p. p.

Flowers borne on terete pedicels, in the leaf axils; verticillasters 6–10-flowered, forming a loose paniculate or rarely spiciform inflorescence; bracts small; calyx tubular or tubular-campulanate, 13-nerved, bilabiate, not constricted under the teeth, usually straight, not gibbous at base; upper lip 3-toothed, not flat; lower lip 2-parted, with 430 subulate teeth; throat with sparse or dense hairs; corolla with exserted tube and 2-lipped limb; upper lip erect, nearly flat, emarginate; lower lip spreading, 3-lobed, the middle lobe the largest; stamens included in corolla or two of them slightly exserted; anthers nearly parallel, divergent, separated by the broad connective; nutlets ovoid or globose, obtuse. Annual and perennial herbs; leaves serrate, the upper with 1 or 2 teeth; bracts small, lanceolate.

A Mediterranean genus, comprising 6 or 7 polymorphic species.

1. Annuals, 7–15 cm high, with slender roots; corolla small, about as long as calyx, whitish . . . . . 1. *C. debilis* (Bge.) Benth.
- + Perennials, with woody, often multicipital roots and creeping rhizome; corolla large, 2–2½ times as long as calyx, pink, purple or lilac . . . . . 2.
2. Corolla 25–30 mm long, twice to 3 times length of calyx; calyx 10–12 mm long; leaves 5–7.5 cm long . . . . . 4. *C. grandiflora* (L.) Moench.

\* Treatment by A. G. Borisova.

\* Plant name occurring in the writings of Aristotle and Dioscorides, derived from Greek *calos*, beautiful, and *minthe*, mint.



- + Corolla 10–15 mm long; calyx 6–9 mm long; leaves 3 (5) cm long . . . . . 3.
- 3. Calyx ca. 7 mm long, the two lower teeth slightly longer than the upper; corolla 9–12 mm long, pale lilac; leaves rounded-ovate, ca. 1 cm long and as broad, with dense short hairs, crenate-serrate, the petiole ca. 5 mm long . . . 3. *C. nepeta* (L.) Savi.
- + Calyx 6–9 mm long, the lower teeth much longer than the upper; corolla 12–15 (17) mm long, pink or purple; leaves ovate, 1–3 cm long, finely pubescent, denticulate; calyx 5–10 mm long . . . . . 2. *C. officinalis* Moench.

Series 1. *Annuae* Boriss. — Annuals; corolla small, about as long as calyx; stamens with abortive anthers.

1. *C. debilis* (Bge.) Benth. in DC. Prodr. XII (1848) 232; Ldb. Fl. Ross. III, 352; Kryl. Fl. Alt. IV, 1014. — *Thymus debilis* Bge. in Ldb. Fl. alt. II (1830) 391. — 433 *Satureja debilis* Briq. in Pflanzenfam. IV, 3a, 3b (1897) 302; Kryl. Fl. Zap. Sib. IX, 2378. — *S. annua* (Schrenk) B. Fedtsch. Rast. Turk. (1915) 682. — *Melissa debilis* Benth. Lab. Gen. et sp. (1832–1836) 391. — *Calamintha annua* Schrenk in Bull. Acad. Sc. Pétersb. X (1842) 353 et Enum. pl. nov. 2 (1842) 26; Ldb. Fl. Ross. III, 351; O. and B. Fedch. Perech. rast. Turk. V, 130; Benth. in DC. Prodr. XII, 227. — *C. caucasica* Somm. et Lev. in Nuov. Giorn. Bot. Ital. (1897) 207; Tr. Bot. sada, XVI, 386. — *lc.*: Ldb. Ic. pl. fl. Ross. V, tab. 438. — *Exs.*: Pl. or. exs. No. 218.

Annual; stems simple or branched, weak, ascending, 7–15 cm high, short-pubescent, 4-angled; leaves 10–20 mm long, 4–10 mm broad, oblong-ovate or ovate, acute, glabrous or with sparse short hairs, green, smooth beneath, glaucescent, sparsely and shallowly denticulate and sparsely bristly-ciliate, entire at base and cuneately narrowed to petiole, this (3) 5–15 mm long, sometimes nearly equaling the blade; verticillasters 2–6 (10)-flowered, axillary, dichotomously branched, on peduncles about half length of leaves; pedicels slender, shorter or longer than calyx, 4–7 mm long; bracts small, lanceolate, acute, setiform; calyx bilabiate, drooping, 5–7 mm long, tubular, with sparse hairs on the nerves outside, with sparse exserted setiform hairs in throat, prominently nerved; upper lip of calyx with 3 broadly lanceolate long-aristate spreading ciliate teeth; lower lip 2-toothed, the teeth lanceolate, subulately point-tipped, somewhat longer than the upper; calyx-tube slightly longer than the limb, slightly gibbous at base; corolla small, about as long as calyx, sometimes slightly longer or shorter, whitish; stamens not exceeding the calyx; anthers of the interior stamens abortive; nutlets small, ca. 0.5 mm long, oblong-ovoid, naked, brown. June–August.

Dry subalpine grassy and stony slopes and shelves [?], rocks and taluses, in the spruce forest belt, at altitudes between 500 and 2000 m; in the Caucasus often as weed in cultivated fields. — Caucasus: Cisc. (Kislovodsk), Dag., E. and S. Transc.; W. Siberia: Irt., Alt. (Aleksandrovskoe village and the town Kent); Centr. Asia: T. Sh. (Kirgizian Alatau, Transilian Alatau), Balkh., Pam.-Al. (Alai range), Dzu.-Tarb. (Dzungarian Alatau). *Gen. distr.*: Dzu.-Kash. (Kul'dzha). Described from Altai (Bukhtarma estuary, the village Aleksandrovskoe). Type in Leningrad.

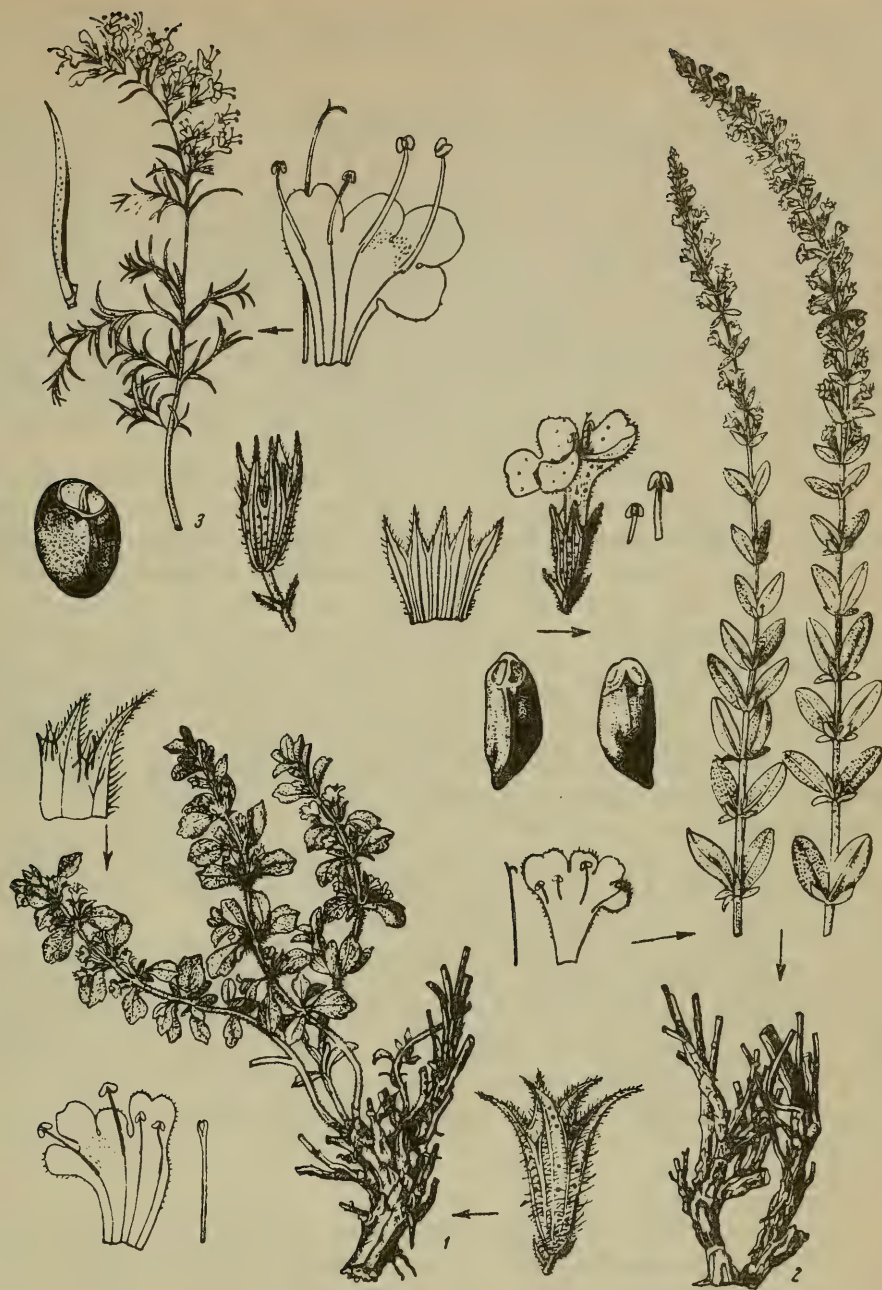


PLATE XXII. 1 – *Satureia intermedia* C.A.M., plant fragment, calyx, part of calyx from inside, corolla, style with stigma; 2 – *Gontscharovia popovii* (B. Fedtsch. et Gontsch.) Boriss., upper part of stems, calyx unfolded, flower, stamen, nutlet from two sides, unfolded corolla; 3 – *Satureia spicigera* (C. Koch) Boiss., upper part of plant, leaf, calyx with bracts, corolla unfolded, nutlet.

Series 2. *Officinales* Boriss. — Perennials, with dense soft hairs, with ovate and orbicular leaves; corolla of medium size, 10–15 mm long.

- 434 2. *C. officinalis* Moench., Meth. pl. (1794) 409; Ldb. Fl. Ross. III, 352; Benth. in DC. Prodr. XII, 228; Boiss. Fl. or. IV, 577. — *Melissa calamintha* L. Sp. pl. (1762) 827; Benth. Lab. Gen. et sp. 388; M. B. Fl. taur.-cauc. II, 62; C. A. M. Enum. pl. cauc.-casp. 88. — *Calamintha ascendens* Jord. Obs. pl. nouv. IV (1846) 8, tab. 1. — *C. menthaefolia* Host, Fl. Austr. II (1831) 129; Grossg. Fl. Kavk. III, 332. — *C. silvatica* Bromf. in English Bot. Suppl. (1849) tab. 2897; Vizn. rosl. URSR, 423. — *Satureia vulgaris* Rouy, Fl. France XI (1909) 334, non Fritsch. — *S. silvatica* K. Maly in Verh. Zool.-bot. Ges. (1904) 260. — *S. calamintha* (L.) Sheele in Flora, XXVI (1843) 577; Fedch. and Fler. Fl. Evrop. Ross. 829. — *Clinopodium calamintha* O. Ktze. Rev. gen. (1891) 515. — *Thymus calamintha* Scop. Fl. carn. ed. 2 (1722) 425. — Ic.: Fedch. and Fler., op. cit., Fig. 750.

Perennial, with a multicipital woody root; stems ascending, 20–50 cm high, densely covered with soft spreading hairs, usually branched; leaves on petiole 5–10 mm long, ovate or rounded-ovate, 1–3 cm long, finely pubescent and punctate-glandular, denticulate, rugose, obtuse; verticillasters 3–7 (8)-flowered, on dichotomously branched peduncles in leaf axils, forming secund paniculate inflorescences on the upper part of stems; bracts lanceolate; calyx 6–9 mm long, with sparse hairs in throat, covered outside on the nerves with very short setiform hairs, bilabiate, with ciliate teeth; lower teeth much longer than the upper, subulate, slightly incurved, the upper teeth very short and broad; corolla 12–15 (17) mm long, twice length of calyx, pink or purple, pubescent, punctate-glandular, bilabiate; lower lip bearded, speckled inside, 3-lobed, the middle lobe emarginate; upper lip emarginate; two of the stamens exserted, the other two shorter than corolla; nutlets ovoid, obtuse. June–September.

Woods, coppices, near water, very rarely in forest-steppe regions. — European part: Bl.; Caucasus: Cisc., Dag., W., E. and S. Transc., Tal. Gen. distr.: Atl. and Centr. Eur., Bal.-As. Min., Arm.-Kurd. Described from Europe.

Note. An extensive examination of live material and habitat conditions is necessary to determine whether the Caucasian plants differ from the European. It has been claimed (Bot. mat. gerb. Bot. inst. AN SSSR, VIII, 4, 1940, 157) that *C. silvatica* Bromf. grows in the Ukraine. On the basis of material at our disposal, we conclude that *C. silvatica* is synonymous with *S. officinalis* Moench.

**Economic importance.** A very aromatic plant. The oil provides a substitute for marjoram oil.

- 435 3. *C. nepeta* (L.) Savi, Fl. Pis. II (1798) 197; Clairv. Man. (1811) 197; Boiss. Fl. or. IV, 577; Shmal'g. Fl. II, 312; Grossg. Fl. Kavk. III, 332. — *Melissa nepeta* Linn. Sp. pl. (1753) 593; ed. Willd. III, 147; M. B. Fl. taur.-cauc. II, 62; Benth. Lab. Gen. et sp. 387. — *M. calamintha* Habl. Taur. (1789) 121, non L. — *C. canescens* C. Koch in Linnaea, XXI (1848) 672 (nec Presl, nec Torr., nec Gray). — *C. nepetoides* Jord. Obs. Pl. crit. IV (1846) 16; Vizn. rosl. URSR, 423. — *Satureja nepeta* Scheele in Flora, XXVI (1843) 577. — Ic.: Hegi, Ill. Fl. V, 4, fig. 3197.



Perennial, white-villous, with multicapital woody root; rhizome creeping; stems 20–60 cm high, obtusely 4-angled, sparingly branched, procumbent or with elongated ascending branches, with sparse hairs; leaves short-petioled or subsessile, rounded-ovate, distantly and shallowly crenate-serrate or subentire, with dense short hairs, canescent above, prominently veined beneath; pedicels shorter than calyx; verticillasters 12–15 (30)-flowered, dichotomously branched, emerging on a common peduncle from the leaf axis; inflorescences loose, long, secund, exceeding the leaves; bracts small, linear or subulate; calyx ca. 5 mm long, tubular, not constricted at throat, the hairs in throat exerted, the three upper teeth lanceolate, somewhat spreading, the lower two subulate, slightly longer; corolla pink or lilac, pale lilac or azure-purple, 9–12 mm long, nearly twice length of calyx; nutlets oblong, brown. July–September.

Exposed sandy hills, stony calcareous slopes and rocks, shale, seashore. — European part: M. Dnp., Bes., Bl., Crim.; Caucasus: W. Transc. **Gen. distr.:** Centr. Eur., Bal.-As. Min. Described from S. Europe. Type in London.

Series 3. *Grandiflorae* Boriss. — Naked or sparsely-haired perennials; leaves 5–7.5 cm long; corolla to 3 cm long.

4. *C. grandiflora* (L.) Moench, Meth. pl. (1794) 408; Ldb. Fl. Ross. III, 353; Benth. in DC. Prodr. XII, 228; Boiss. Fl. or. IV, 376; Shmal'g. Fl. II, 312; Grossg. Fl. Kavk. III, 331. — *Melissa grandiflora* L. Sp. pl. (1753) 532; M. B. Fl. taur.-cauc. II, 61; Benth. Lab. Gen. et sp. 394. — *Satureja grandiflora* Scheele in Flora, XXVI (1843) 577. — *Thymus grandiflorus* Scop. Fl. carn. ed. II, 1 (1772) 424. — *Clinopodium grandiflorum* O. Ktze. Rev. gen. (1891) 515. — Ic.: Fedch. and Fler. Fl. Evrop. Ross., Fig. 749. — Exs.: GRF, No. 833.

Perennial, with creeping rhizome, with sparse short hairs, rough, 20–50 cm high; stems herbaceous, slender, erect or ascending, branching; leaves petiolate, the upper lanceo-  
436 late, the others ovate or oblong-ovate, large, 5–7.5 cm long, 2.5–4 cm broad, acute, coarsely and sharply serrate, the middle orbicular, the lower sometimes subcordate; terminal leaves much smaller, elliptical, cuneate at base; peduncles branched, spreading; verticillasters axillary, 3–7-flowered; pedicels short to fairly long; bracts small, linear-subulate, linear or lanceolate, ciliate; calyx 10–12 mm long, with almost naked throat, the teeth spreading, ciliate, the upper ovate, acuminate, the lower slightly longer, subulate from triangular base; corolla pink or purple, 25–30 mm long, 3 times length of calyx; upper lip ciliate; lower lip 3-lobed, the middle lobe cordate; stamens very short; nutlets 1.25 mm long, 1 mm broad, rounded-ovaloid to subglobose, dark brown or black, smooth. May–August. (Plate XXIII, Figure 1.)

Shady mountain woods. — European part: Crim.; Caucasus: W.E. and S. Transc., Tal. **Gen. distr.:** S. Eur., Bal.-As. Min. Described from Italy. Type in London.

Genus 1293.\* **Clinopodium\*\*** L.

L. Sp. pl. (1753) 587

Flowers in dense, rarely few-flowered, distant verticillasters, on common peduncle at ends of stem and branches, in the axils of upper leaves on very short peduncles or subsessile, with an involucre of linear corymbose long-haired braces and bracteoles, these about as long as or shorter than calyx; pedicels terete; calyx bilabiate, tubular, 13-nerved, somewhat curved and slightly constricted at throat, the throat open, with sparse hair not forming a ring, the two teeth of lower lip setiform, one-third to nearly half length of calyx; upper lip flat, at length spreading, with three shorter lance-linear teeth; corolla purple, pink or white, usually pubescent outside, bearded inside near the lower lip or with two rows of distally enlarged flat hairs; upper lip flat, emarginate, erect; lower lip 3-lobed; stamens usually not exceeding the corolla, the anthers divergent, obliquely attached to dilated connective; stigma with flat ribbonlike lobes; nutlets globose. Perennials, with petiolate or sessile, ovate, oblong-ovate or orbicular leaves.

437 About ten species, distributed in the Mediterranean region and S. and E. Asia.

1. Leaves large, deeply toothed, petiolate, the upper with short petiole; bracts and bracteoles subulate or setiform, half length or sometimes nearly full length of calyx . . . . . 3.
- + Leaves shallowly crenate-serrate or entire, the upper often sessile; bracts and bracteoles numerous, exceeding the calyx, filiform . . . . . 2.
2. Leaves dentate-crenate or serrate-crenate; bracts, bracteoles and calyx without glandular hairs; corolla 12–15 mm long, exceeding the calyx (Europe, Caucasus) . . . . . 1. *C. vulgare* L.
- + Leaves entire, rarely with few obsolescent teeth; indument of bracts and calyx comprising glandular hairs; corolla 8–10 (11) mm long, scarcely exceeding the calyx (Centr. Asia) . . . . . 2. *C. integerrimum* Boriss.
3. Corolla not exceeding the calyx; flowers 3.5–4 mm long; almost glabrous plants, with sparse hairs on leaves and stems; leaves coarsely and deeply toothed (Sakhalin) . . . . . 4. *C. sachalinense* (Fr. Schm.) Koidz.
- + Corolla 9–11 mm long; one-and-a-half times to twice as long as calyx; pubescent or diffusely-haired plants . . . . . 4.
4. Corolla 10–11 mm long; whorls distant; plants 50–100 cm high; stems simple; bracts and bracteoles nearly equaling the calyx, linear, conspicuous (Uss., Ze.-Bu.) . . . . . 5. *C. chinense* (Benth.) O. Ktze.
- + Corolla ca. 9 mm long; whorls approximate; plants branched from base, often with weak curved stems, 15–30 (60) cm high; bracts small, inconspicuous, half the length of calyx (Caucasus) . . . . . 3. *C. umbrosum* (M. B.) C. Koch

\* Treatment by A. G. Borisova.

\*\* Name of an aromatic plant mentioned by Dioscorides, derived from Greek *cline*, bed, and *pous*, foot.

Series 1. *Vulgaria* Boriss. — Pubescent plants; upper leaves sessile, shallowly crenate-dentate and serrate or entire; whorls 1–3-flowered; bracts filiform, twice as long as calyx.

1. *C. vulgare* L. Sl. pl. (1753) 587; M. B. Fl. taur.-cauc. II, 57. — *Melissa clinopodium* Benth. Lab. Gen. et sp. (1832–1836) 392. — *Calamintha clinopodium* Benth. in DC. Prodr. XII (1848) 233; Ldb. Fl. Ross. III, 355; Boiss. Fl. or. IV, 579; Grossg. Fl. Kavk. III, 331; Shmal'g. Fl. II, 313. — *C. vulgaris* Druce in Ann. Scot. Nat. Hist. (1906) 224. — *Satureja clinopodium* Caruel in Parl. Fl. Ital. VI (1883) 135; Syreishch. Fl. Mosk. gub. III, 82. — *S. vulgaris* Fritsch. Exc. fl. Oesterr. (1909) 477 non Rouy. — Ic.: Hegi, Ill. Fl. V, 4, fig. 3201; Fedch. and Fler. Fl. Evrop. Ross., Fig. 751; Syreishch., op. cit. 82.

Pubescent perennial; stems 30–60 cm high, erect or ascending, usually simple; 438 leaves ovate or oblong-ovate, remotely dentate or crenate-serrulate, mostly with sparse hairs above, with hairs on the veins beneath; uppermost leaves reflexed; flowers in numerous dense capitulate distant verticillasters; bracts and bracteoles linear-subulate, with stiff spreading hairs; calyx 8–10 mm long, slightly constricted at throat, without a ring of hairs; teeth subulate, two of them 3 mm long, the other three 1.5–2 mm long; corolla purple, one-and-a-half times as long as calyx, 12–15 mm long; style exserted; nutlets globose, 1 mm long and broad. June–September.

Coppices, woods, open forests (mostly deciduous). — European part: Kar.-Lap., Lad.-Ilm., Dv.-Pech., Balt., V.-Kama, V.-Don, V. Dns., M. Dnp., U. Dnp., Bl., L. Don, L.V., Transv., Crim.; Caucasus: throughout; W. Siberia: U. Tob. (Tobol'sk); E. Siberia: Dau., Lena-Kol. (Yakutsk). Gen. distr.: W. Europe. Described from W. Europe. Type in London.

**Economic importance.** Used medicinally as an aromatic plant. A tea substitute and condiment. Nectariferous, with an average daily output of 0.35 mg per day, the total amount of nectar from a closely planted crop being 80 kg per hectare, with an absolute sugar content about 40 kg. Also of tinctorial value.

2. *C. integririmum* Boriss. in Bot. mat. gerb. Bot. inst. AN SSSR, XV (1953) 328. — *C. vulgare* auct. fl. Turk. — *Calamintha clinopodium* O. et B. Fedtsch. Perech. rast. Turk. V (1913) 131, non Benth.

Perennial, covered with short spreading hairs; stems 30–40 cm high, usually unbranched, ascending or erect, 4-angled, with recurved hairs; leaves ovate or oblong-ovate, 1.5–3 cm long, 1.5–2 cm broad in lower part, entire or nearly so, with few spreading hairs on both sides, prominently veined beneath, subacute, rounded at base, the upper sessile, the lower with petiole 3–10 mm long; inflorescences many-flowered, dense, distant; verticillasters 1–2 (3) in number, 2.5–3 cm broad, ca. 1.5 cm high, in the axils of two opposite leaves; bracts and bracteoles numerous, filiform, long-haired, about as long as calyx; calyx ca. 9 mm long, slightly curved, covered outside with glandular and simple hairs, with few hairs or naked in throat, two of the teeth 4–5 mm long, the other three ca. 3 mm long; corolla 8–10 (11) mm long, violet-purple, hairy outside, sometimes scantily so; stamens and style included in corolla; nutlets ca. 1 mm long and 0.75 mm broad, ovoid. Fl. May–July; fr. July–August. (Plate XXVI, Figure 2.)



Mountains, slopes, river banks, shrubs, thickets in ravines, walnut woods, stony and  
439 coarsely sandy soils, at altitudes about 1500 m. — Centr. Asia: Mtn. Turkm., T. Sh.  
(Chatkal range), Arslanbob (Fergana range), Pam.-Al. (Vakhsh, Gissar and Alai ranges).  
**Gen. distr.:** possibly in Iran. Described from Kopet Dag. Type in Leningrad.

**Note.** Features distinguishing this species from *C. vulgare* L. include: entire  
leaves, presence of glandular hairs on calyx and bracts, less curved calyx with longer  
teeth, scarcely exerted smaller corolla, style shorter than corolla, and shape of nutlets.

**Series 2. *Umbrosa* Boriss.** — Plants covered with scattered hairs, subglabrous or  
lanate; leaves usually deeply large-toothed, petiolate, the upper sometimes short-pe-  
tioled; whorls 5–10 in number; bracts half to nearly whole length of calyx, subulate or  
setiform.

3. *C. umbrosum* (M. B.) C. Koch in Linnaea, XXI (1848) 673. — *C. repens* Benth.  
in Wall. Pl. As. rar. I (1830) 66. — *Melissa umbrosa* M. B. Fl. taur.-cauc. IV (1808)  
63 et III, 407; Benth. Lab. Gen. et sp. 392. — *Calamintha umbrosa* Fisch. et Mey.  
Ind. sem. VI (1840) 6; Benth. in DC. Prodr. XII, 232; Ldb. Fl. Ross. III, 955; Boiss.  
Fl. or. IV, 578; Grossg. Fl. Kavk. III, 331. — **lc.:** Fl. Gruz. VII, Fig. 331. — **Exs.:**  
Pl. or. exs. No. 294.

Perennial; stems numerous, weak elongate, 4-angled, (15) 30–60 cm high, often  
ascending at base, green, covered with scattered hairs, subglabrous at base or hairy on  
the ribs, branching; leaves oblong-ovate or cordate-ovate, sharply serrate-dentate,  
rounded or cuneate at base, petiolate, subacute, hairy; verticillasters 1–5, 20–40-  
flowered, approximate, forming oblong or ovaloid inflorescences; peduncles shorter  
than leaves; bracts and bracteoles setiform, small, half the length to longer than calyx,  
shorter to slightly longer than pedicels; calyx slightly curved, 5–6 mm long, with patent  
hairs, long-ciliate on nerves and teeth, gibbous at base, naked in throat, colored at  
apex, bilabiate, the upper teeth lanceolate, the lower longer, subulate or lance-subu-  
late; corolla one-and-a-half times as long as calyx, sometimes smaller, purple; upper stamens  
often sterile; nutlets rounded-ovoid, 1 mm long, 0.75 mm broad, smooth. June–  
September. (Plate XXVI, Figure 3.)

Shady forests and coppices in the lower forest belt, at altitudes of 1200 to 1500 m,  
440 occasionally a weed. — Caucasus: Dag., E. and W. Transc., Tal. **Gen. distr.:** Iran.  
Described from the Caucasus (Iberiya). Type in Leningrad.

**Economic importance.** Contains a lemon-scented essential oil.

4. *C. sachalinense* (Fr. Schm.) Koidz. in Tokyo Bot. Mag. XLIII (1929) 387;  
Sugawara, Ill. Fl. of Saghal. IV (1940) 1603. — *Satureja sachalinensis* (Fr. Schm.)  
Kudo in Journ. college of Sc. Univ. Tokyo, XLIII, 8 (1921) 34. — *Calamintha um-*  
*brosa* Benth. var. *sachalinensis* Fr. Schmidt. Reise (1868) 164; Miyabe et Miyake,  
Fl. Saghal. 364. — *C. multicaulis* Maxim. in Mém. Biol. IX (1874) 444 et in Bull.  
Acad. Sc. Pétersb. XX (1875) 466. — *Satureja multicaulis* Nakai Tokyo Bot. Mag.

XXXV (1921) 194. — *S. ussuriensis* Kudo, Lab. Sin. Jap. (1929) 101, p. p. — Ic.: Sugawara, l. c. tab. 734, p. 1602.

Perennial; stems numerous, erect or ascending, 30–60 cm high, glabrous in lower part, sparsely-haired on the ribs above, 4-angled, sulcate, simple, with branches only in upper part; leaves petiolate, ovate to oblong-ovate, 2–8 cm long, 1.5–3 cm broad, deeply and coarsely crenate-dentate and sparsely ciliate, subacute, cuneate at base, prominently veined, glabrous, scantily covered on both sides (mainly on the veins) with inconspicuous hairs; upper leaves reduced to bracts; flowers in verticillasters at ends of stem and on lateral branches; whorls numerous (5–10), rather loose, many-flowered, the lower distant; lower bracts foliaceous, narrow, with several teeth; other bracts numerous, linear or lance-linear, ciliolate, slightly exceeding the pedicels, equaling the calyx; axis of inflorescence and peduncles hairy; calyx sparsely ciliate, ca. 4 mm long, campanulate, slightly curved, sparsely-haired in throat and on the nerves, three teeth flat, short-triangular, glabrous, the other two lanceolate, subulate-acuminate, ciliate; corolla white, with a pink spot on the lower lip or red (?), bilabiate, 3.5–4 mm long, not exerted, pubescent outside, the lower lip with two shallow obtuse lobes, the upper lip obtusely 2-lobed; stamens with divergent anthers, two equaling the corolla, two shorter; style linear, as long as corolla; stigma 2-lobed, one of the lobes long, twisted, linear, the other short, straight; nutlets ovoid, 0.75–1 mm long, 0.5 mm broad, smooth, 2-nerved on the back. Fl. July–August; fr. August.

Far East: Sakh. Gen. distr.: N. Japan. Described from Sakhalin. Type in Japan.

- 441 5. *C. chinense* (Benth.) O. Ktze. Rev. Gen. pl. II (1891) 515; Makino in Tokyo Bot. Mag. XX, 3; Matsum. Ind. Pl. Jap. II, 2, 538; Sugawara, III. Fl. of Saghal. IV, 1604. — *Calamintha chinensis* Benth. in DC. Prodr. XII (1848) 233; Maxim. Prim. Fl. Amur. 217 (var. *grandiflora* Maxim.); Korsh, Pl. Amur. 377; Palib. Consp. Fl. Korea, II, 27; Kom. Fl. Man'chzh. III, 374. — *C. clinopodium* Rgl. Tent. Fl. Ussur. (1861) 117, non Benth. — *C. ussuriensis* Sugaw. l. c. (1940) 1601, non Rgl. et Maak. — *Calamintha clinopodium* Benth. var. *chinensis* Miq. in Ann. Mus. Bot. Lugd.-Bat. II (1865–1866) 236 et Prol. fl. Jap. (1866–1867) 69. — (?) *C. koreana* Lévl. in Fedde, Repert. Nov. sp. IX (1911) 246. — *Clinopodium vulgare* Thunb. Fl. Jap. (1784) 247, non L. — *Satureja chinensis* Briq. in Pflanzenfam. IV, 3a (1897) 302; Sugawara, Pl. of Saghal. (1937) 272. — Ic.: Sugawara, l. c. (1940) tab. 733, p. 1603. — Exs.: GRF, No. 3468.

Perennial; stems erect or procumbent, pubescent or lanate with copious hairs, sometimes glabrous below; leaves ovate or oblong-ovate, obtuse at apex, serrate-dentate, pubescent or lanate on both sides, 3.5–6 cm long, 1.5–2.5 cm broad, with petiole 2–5 cm long, the lower equal, the upper reduced to bracts; verticillasters very dense, many-flowered, distant, with firm subulate bracts and numerous bracteoles equaling or shorter than calyx; calyx violet or red, the teeth ciliate, the lower narrow; corolla about as long as or slightly longer than calyx; nutlets globose, 1 mm long, 1 mm broad, smooth, acute or subobtuse at base. Fl. July–September.

Riverside meadows, thickets, wood margins, broad-leaved forests, pastures, wastelands, sometimes arable fields. — Far East: Ze.-Bu., Uss., Sakh. Gen. distr.: China, Korea, Japan. Described from China. Type in London.

# Genus 1294.\* **Acinos\*\*** Moench

Moench, Meth. pl. (1794) 407

Inflorescence consisting of distant 2–6-flowered verticillasters in the leaf axils, without common peduncle; flowers on short flattened upright pedicels; bracts and bracteoles small, lanceolate, or absent; calyx bilabiate, unequally toothed, 13-nerved, sulcate, villous-lanate, narrowly urceolate, gibbous at base (especially in fruit), constricted and hairy in throat with a continuous ring of straight hairs; corolla open, hairy, slightly inflated at throat; upper lip erect, emarginate; lower lip spreading, 3-lobed, the middle lobe concave; nutlets ovoid, rounded at apex. Annuals, rarely 442 perennials, usually branching from base.

About ten species, distributed mainly in the Mediterranean region.

1. Flowers 12–20 mm long, intensely blue (Carpathians). . . . . 4. **A. alpinus** (L.) Moench.
- + Flowers 5.5–8.5 (11) mm long . . . . . 2.
2. Leaves ovate to oblong, the petiole shorter than blade; corolla nearly twice as long as calyx; hirsute plants . . . . . 1. **A. thymoides** (L.) Moench
- + Leaves rounded-elliptical or rounded-rhomboid, the petiole about as long as blade; corolla slightly exceeding the calyx; hirsute-villous plants . . . . . 3.
3. Calyx 8–10 mm long; corolla 8–10 mm long; stems and leaves short-haired; leaves to 1.5 cm broad . . . . . 2. **A. fominii** Schost.
- + Calyx 5–7 mm, rarely 10 mm long; corolla 5.5–7 mm, rarely 11 mm long; stems and leaves covered with long multicellular hairs; leaves to 1 cm broad . . . . . 3. **A. graveolens** (M. B.) Link.

1. **A. thymoides** (L.) Moench, Meth. pl. (1794) 407. — **A. vulgaris** Pers. Syn. II (1807) 131; C. A. M. Enum. pl. cauc.-casp. 88. — **Calamintha arvensis** Lam. Fl. Franc. 2 (1778) 394. — **Satureja acinos** (L.) Scheele in Flora, XXVI (1843) 577; Fedch. and Fler. Fl. Evrop. Ross. 829; Fl. Yogo-Vost. VI, 170; Kryl. Fl. Zap. Sib. IX, 2379; Syreishch. Fl. Mosk. gub. III, 81. — **Calamintha acinos** Clairv. Man. Herb. (1811) 197; Gaud. Fl. Helv. IV (1829) 84; Benth. in DC. Prodr. XII, 230; Shmal'g. II, 313; Grossg. Fl. Kavk. III, 330. — **Thymus acinos** L. Sp. pl. (1753) 591; M. B. Fl. taur.-cauc. II, 60. — **Melissa acinos** Benth. Lab. gen. et sp. (1832–1836) 389. — **Clinopodium acinos** O. Ktze. Rev. gen. (1891) 513, 515. — **Thymus canescens** Dumort. Fl. Belg. (1827) 47. — Ic.: Hegi, Ill. Fl. V, 4, fig. 3201, a, b, tab. 230, 5; Fedch. and Fler., op. cit., Fig. 752; Syreishch., op. cit. 81; Fl. Gruz. VII, 332. — Exs.: Pl. Finl. exs. No. 335; GRF, No. 1624.

Annual or biennial, erect or nearly so; stems several, simple or sparingly branched, 10–30 cm high, covered with falcately recurved retrorse hairs; leaves ovate to oblong or oblong-rhomboid, acuminate, cuneate at base, with few little teeth at apex or subentire, 7–15 mm long, 3–8 mm broad, prominently veined, short-haired beneath over

\* Treatment by A. G. Borisova.

\*\* From Greek *akinos*, grain, referring to the four achenes composing the fruit.



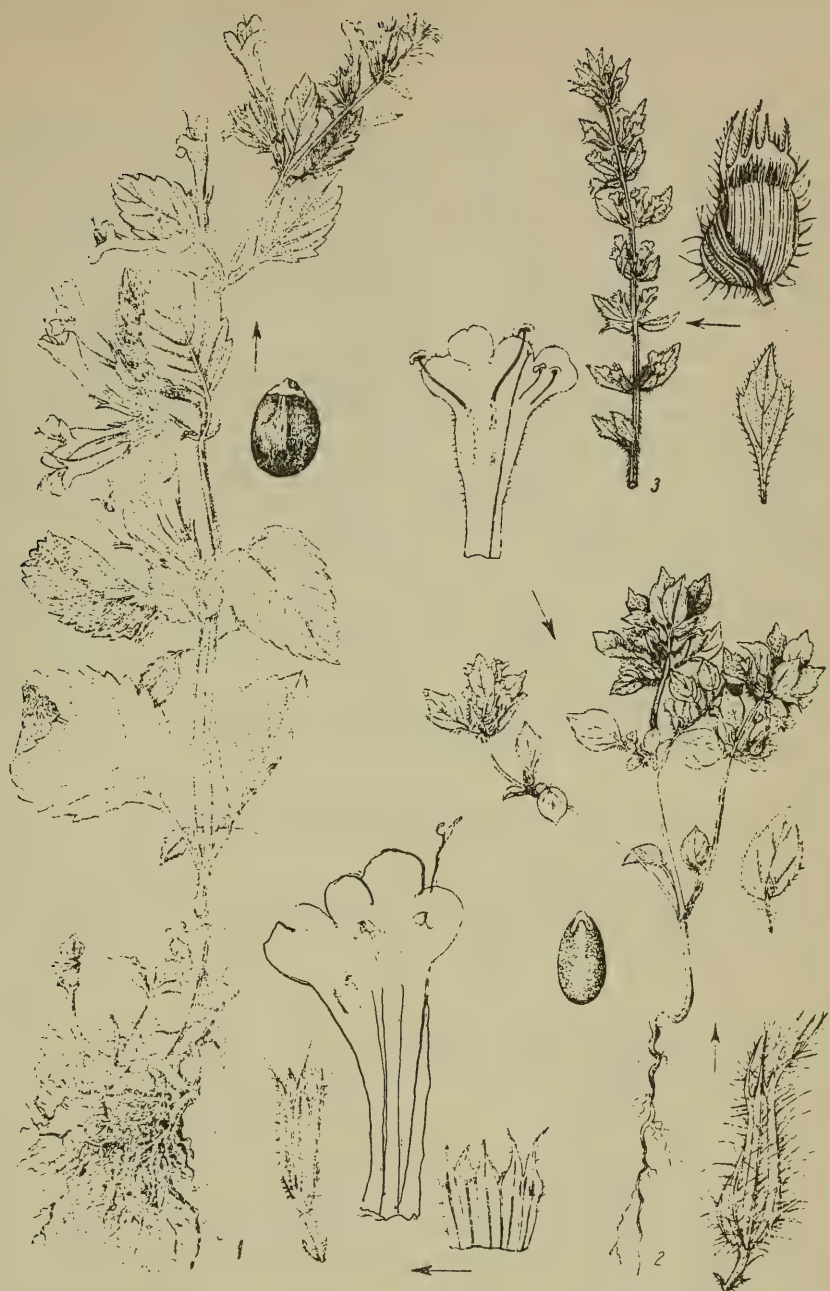


PLATE XXIII. 1 - *Calamintha grandiflora* (L.) Moench, general aspect, calyx, corolla unfolded, nutlet; 2 - *Acinos graveolens* (M.B.) Link, general aspect, corolla unfolded, nutlet, leaf, calyx; 3 - *A. thymoides* (L.) Moench, upper part of stem, calyx unfolded, leaf.

445 the whole surface or only on the veins, subglabrous or rarely short-haired above, the petiole shorter than blade; flowers on pedicels (1.5–2 mm long), in rather loose 2–6-flowered verticillasters in the axils of upper leaves; bracts shorter than pedicels, small, acute, covered with long and short hairs; calyx 4–6 mm long, unequally 5-toothed, nearly bilabiate, three of the teeth short, spreading subulate, the other two erect, longer, finely subulate, disposed below the upper; calyx-tube nearly twice as long as the teeth, curved, constricted at the base of teeth, gibbous in lower part (especially in fruit), with a ring of straight setiform white hairs in throat, strongly ribbed outside, covered (like the pedicel) with glandular and eglandular hairs, on the ribs also with long bristly curved hairs; corolla violet-purple, scarcely exceeding to one-and-a-half times the length of calyx, 6–8 (10) mm long, short-pubescent outside, naked inside; upper lip half-rounded, emarginate; middle lobe of lower lip one-and-a-half times as broad as the rounded-ovate lateral lobes; anther-locules subdivergent; style with flattened lower lobe; nutlets smooth, oblong, brown, 1.25 mm long, 0.5 mm broad. June–October. (Plate XXIII, Figure 3.)

Dry sunny slopes, sandy fields, steppes, wastelands, pine woods, chalky slopes, calcareous rocks. A widespread plant, often a weed. — European part: Kar.-Lap., Balt., Lad.-Ilm., U.V., V.-Kama, U.Dnp., M. Dnp., V.-Don, Transv., U.Dns., Bes., Bl., Crim., L.D., L.V.; Caucasus: Cisc., Dag., E. and S. Transc., Tal. Gen. distr.: Almost throughout Europe, Bal.-As. Min., Arm.-Kurd. Described from W. Europe. Type in London.

Note. The species *Acinos eglandulosus* Klok., described from the Odessa area, differs from *A. thymoides* Moench in more copious, long indument that does not comprise stipitate glands; weakly crenate to subentire leaves; more brightly colored flowers.

**Economic importance.** The leaves have a 230 mg% vitamin content. Also used as condiment, as source of essential oil and as a medicinal plant.

2. *A. fominii* Shost. Sb. pamyati akad. Fomina, V (1938) 39; Vizn. rosl. URSR, 424. — *Calamintha graveolens* auct. non Benth.: Ldb. Fl. Ross. III, 354; Shmal'g. Fl. II, 313, ex p. — *Satureja rotundifolia* Briq. in Pflanzenfam. IV, 3a (1897) 302, non Pers.; Fedch. and Fler. Fl. Evrop. Ross. 830. p. p. — Ic.: Shost., op. cit. Fig. 1–2.

446 Annual; stems simple or branching, 6–30 cm high, densely covered with short unicellular and 2–3-celled hairs of medium length as well as sparse glandular hairs, sometimes also with long setiform and more numerous glandular hairs; leaves orbicular, rounded-rhomboid, obovate, 6–24 mm long, 5–15 mm broad, abruptly pointed at apex, serrate in upper part, entire below, cuneate at base, long-petioled, with rather copious short hairs on both sides, with more numerous and longer hairs on the veins, ciliate or eciliate at margin, prominently veined beneath; verticillasters 3–5-flowered in each of the upper leaf axils, forming a spikelike inflorescence; pedicels flat, 2–4 mm long, hairy, with some glandular hairs; bracts lanceolate; calyx tubular, 6.5–7.5 mm long, slightly gibbous anteriorly, narrowed above after anthesis, closed, bilabiate; lower lip scarcely longer than the upper, with 2 lanceolate teeth one-third the length of the tube; upper lip with 3 triangular mucronate teeth 1–1.5 mm long; calyx densely short-glandular, sparsely setiferous on the nerves, with a ring of hairs in throat, the teeth ciliate at margin, naked inside; corolla lilac-rose, 7–8.5 mm long, with cylindrical tube, slightly dilated at base, infundibular at apex; upper lip flat, scarcely emarginate; lower lip with oblong lobes; corolla-tube half-covered with short hairs, naked inside, with

hairs in throat at base of lower lip; anthers naked, with a broad connective; lobes of stigma unequal; nutlets oblong, pale yellow, 1.75 mm long, 0.6 mm broad. May–June.

Stony calcareous slopes. — European part: Bl., L. Don. Endemic. Described from the river Krynka. Type in Kiev.

3. *A. graveolens* (M. B.) Link, Enum. pl. Hort. Berol. II (1822) 117; C. A. M. Enum. pl. cauc.-casp. 88. — *Acinos canus* Rchb. Fl. Germ. exc. (1830) 327, non Pers. p. p. — *Thymus graveolens* M. B. Fl. taur.-cauc. II (1808) 60 et III (1819) 406. — *Calamintha graveolens* Benth. in DC. Prodr. XII (1848) 231, p. p.; Ldb. Fl. Ross. III, 354; Boiss. Fl. or. IV, 583; Shmal'g. Fl. II, 313, ex parte. — *C. rotundifolia* Grossh. Fl. Kavk. III, (1932) 331, non Pers. — *Satureja rotundifolia* Fedtsch. et Fler. Fl. Evrop. Ross. (1910) 830, non Briq. — *Melissa graveolens* Benth. Lab. Gen. et sp. (1832–1836) 390, p. p. — Ic.: M. B. Ic. pl. rar. Ross. I, t. 38.

Annual; stems 10–20 cm high, hirsute-villous, branching from base, 4-angled, covered with long multicellular hairs, often violet-tinged; leaves rounded-elliptical, to 1 cm broad, acute, the lower obtuse, subserrate at apex, hirsute, with long hairs mainly on the veins beneath, the petiole as long as or longer than blade; verticillasters 6 (3–4)-flowered, much shorter than leaves; flowers subsessile; calyx 5–6 mm, rarely 10 mm long (var. *macrocalyx* Scheng.), long-haired (the hairs exceeding calyx diameter at anthesis), eglandular, the teeth about as long as the tube, the upper horizontally spreading; corolla 5.5–6.5 mm, rarely ca. 11 mm long (var. *macrocalyx* Scheng.), slightly exceeding the calyx, purple; upper lip short, obtuse; lower lip 3-lobed, the lobes rounded subequal; stamens and style shorter than corolla; nutlets oblong, ca. 1.75 mm long, 1 mm broad, yellowish to light brown. May–September. (Plate XXIII, Figure 2.)

Exposed sunny places, fields. — European part: Bl., L. Don, Crim.; Caucasus: Cisc., Dag., E. and S. Transc., Tal.; Centr. Asia: Mtn. Turkm. Gen. distr.: Bal.-As. Min., Iran, Med. (E.). Described from Crimea. Type in Leningrad.

Note. In the Caucasus, *A. graveolens* varies greatly in shape and size of leaves and in indument. A short-haired form distributed in parts of Georgia, Armenia and Azerbaidzhan has suborbicular leaves, calyx up to 10 mm long, upper calyx-teeth obliquely ascending, corolla ca. 11 mm long (var. *macrocalyx* Scheng.).

4. *A. alpinus* (L.) Moench, Meth. pl. (1794) 407; Vizn. rosl. URSR, 424. — *Melissa alpina* Benth. Lab. Gen. et sp. (1848) 390. — *Calamintha alpina* Lam. Fl. Franc. II (1778) 394. — *Thymus alpinus* L. Sp. pl. (1762) 826. — *Th. montanus* Crantz, Stirp. Austr. (1769) 278.

Perennial, 10–15 cm high; stems hairy, woody at base, strongly branched; fertile shoots ascending; leaves petiolate, suborbicular or ovate, acuminate, with 2–4 small teeth each side of midrib; floral leaves about equaling the calyx; verticillasters with 4–6 subsessile flowers; calyx rucescent, the teeth half the length of the tube; corolla violet, 12–20 mm long, more than twice length of calyx, strongly dilated in throat; upper lip and middle lobe of lower lip very shallowly emarginate; anther-locules divergent; style with flattened lower lobe. July–August.

Rocks, shady mountain slopes; a subalpine species. — European part: U. Dns. Gen. distr.: S. Europe. Described from Europe. Type in Berlin.



Genus 1295.\* *Amaracus*\*\* Gleditsch.

Gleditsch. Syst. pl. (1764) 189. — *Origanum* sect. *Amaracus* Boiss. Fl. or. IV (1879) 547

Calyx campanulate, bilabiate, cleft to base; corolla 2-lipped, the upper lip suberect; stamens 4, two of them much exserted; nutlets ovoid. Densely leafy perennials; inflo-  
448 rescence spikelike; bracts large, membranous, covering and exceeding the calyx.

The genus contains about thirteen species distributed in the Mediterranean region.

1. *A. rotundifolius* (Boiss.) Briq. in Pflanzenfam. IV, 3a (1897) 306; Grossg. Fl. Kavk. III, 332. — *Origanum rotundifolium* Boiss. Diagn. ser. II, 4 (1859) 11; Boiss. Fl. or. IV, 550. — Exs.: Fl. Cauc. exs. No. 273.

Perennial; stems ascending, 10–20 cm high, densely leafy, pale green, sparsely hairy only in lower part; leaves sessile, prominently veined, sparsely punctate-glandular, subcoriaceous, rounded-ovate or orbicular, cordate at base, obtuse; inflorescence short, subacute, ovate, half the length of the tube, the two lower lanceolate; corolla pink or whitish, base; calyx campanulate, light-colored, ca. 7 mm long, cleft on one side, the upper teeth subacute, ovate, half as long as the tube, the two lower lanceolate; corolla pink or whitish, scantily haired or glabrous, 2–2½ times length of calyx, 18 mm long, bilabiate; lower lip 3-lobed, the lobes ovate, obtuse; upper lip oblong, suberect; two stamens exserted 4 mm from corolla, the other two reaching the throat; anthers divergent; nutlets ovoid, dark brown, 1.25 mm long, 1 mm broad. June–September. (Plate XXI, Figure 3.)

Mountains, rocky and stony sites, dry slopes. — Caucasus: W. Transc. Gen. distr.: Arm.-Kurd. Described from the vicinity of Batumi. Type in Geneva.

Note. Of ornamental value owing to the light-colored bracts and calyx, combined with pink corolla.

Subtribe *B. hyssopinae* Briq. in Pflanzenfam. IV, 3a (1895) 208 et 306. — Calyx tubular, 15-nerved, regularly 5-toothed; corolla bilabiate, with flat lips; stamens 4, the filaments ascending from base, at length spreading, straight. Subshrubs.

Genus 1296.† *Hyssopus*†† L.

L. Sp. pl. (1753) 569

Inflorescences oblong or elongate, mostly one-sided, many-flowered, spikelike, formed by approximate or distant axillary whorls; calyx tubular-campanulate or cam-  
449 panulate, 15-nerved, nearly regular, with 5 subequal teeth, glandular, often colored,

\* Treatment by A. G. Borisova.

\*\* From Greek *amaracon*, name for marjoram used by classical authors.

† Treatment by A. G. Borisova.

†† A plant name used by Dioscorides; probably derived from the ancient Hebrew word *esob*, designating a scented sacred herb.

naked in throat; corolla bilabiate, hairy, glandular, mostly with prominently exerted tube; upper lip almost flat, emarginate or 2-lobed, sometimes subentire; lower lip 3-lobed, the middle lobe the largest; stamens 4, mostly exerted; anther-locules divergent, dehiscent by a common slit; style 2-parted at apex; nutlets oblong or oblong-ovoid. Perennial herbs or subshrubs; leaves glandular, mostly linear or oblong.

A paleomediterranean genus, containing about fifteen species distributed in S. Europe, Middle and Central Asia, Caucasus and N. Africa. One species grows in the Volga and Don river basins.

**Economic importance.** Medicinal plants, used for home treatment of various ailments; nectariferous and containing essential oil. The oil, with a scent reminiscent of turpentine and camphor, is used as an ingredient in liqueur production and as a condiment. The plant has a strong balsam scent.

Hyssop has been cultivated since remote antiquity. Cultivation in Europe began in the Middle Ages when the plant was used as medicament and spice. In the USSR, the plant is cultivated in the Caucasus, Crimea and Central Asia.

1. Leaves and bracts linear, mostly longer than internodes, subulate-pointed; calyx-teeth terminating in a long subulate cusp; nutlets glandular on one side (S. Altai, E. Tarbagatai, Dzungarian Alatau) . . . . . 5. *H. cuspidatus* Boriss
- + Leaves and bracts not subulate-pointed and when pointed then leaves oblong and shorter than internodes; calyx-teeth not cuspidate . . . . . 2.
2. Corolla ca. 15 mm long, the middle lobe of lower lip emarginate, to 9 mm broad; stamens to 2 cm long, subequal; nutlets hairy on one side (N. Kazakhstan) . . . . . 7. *H. macranthus* Boriss.
- + Corolla 8–12 mm long; middle lobe of lower lip much narrower than the lateral lobes; stamens 9–15 mm long, usually unequal . . . . . 3.
3. Stems terete; corolla 8–10 mm long, the tube short; leaves not revolute-margined, the midvein obscure; nutlets with a hairy coma at apex (chalk mountains in Volga and Don river basins) . . . . . 6. *H. cretaceus* Dub.
- + Stems distinctly 4-angled; corolla 10–11 mm long, the tube rather long and, if short, then calyx large; leaves mostly with a revolute margin and distinct midvein; nutlets naked . . . . . 4.
- 450 4. Leaves oblong or lance-oblong, obtuse or subobtuse, 10–25 mm long, 4–6 (8) mm broad, shorter than internodes; calyx mostly dark violet (Pamir-Alai) . . . . . 8. *H. seravschanicus* (Dub.) Pazij.
- + Leaves linear, 1–6 cm long, 1–8 (mostly 1–4) mm broad, acute or subacute, usually exceeding, rarely equaling or shorter than internodes . . . . . 5.
5. Lower leaves sometimes toothed; stems covered with short crisp hairs; calyx-teeth narrowly lanceolate, about half the length of the tube; two stamens slightly exceeding the corolla, the other two markedly so; leaves narrowly linear (Caucasus) . . . . . 2. *H. angustifolius* M. B.
- + Leaves always entire; stems glabrous or subglabrous; calyx-teeth broadly triangular or lanceolate and then calyx 8–10 mm long; stamens mostly much longer than corolla . . . . . 6.

6. Corolla-tube barely exserted; calyx 8–10 mm long; leaves 2–4 cm long, 5–8 mm broad (cultivated in Centr. and S. Russia, sometimes escaped). . . 1. *H. officinalis* L.
- + Corolla-tube usually exserted; calyx 5–6 mm long; leaves 1–6 cm long, 1–4 mm broad (Centr. Asia) . . . . . 7.
7. Inflorescence branched, with short lateral flower “clusters” ca. 1 cm long; terminal inflorescences 1–5 cm long; calyx rose-violet; all stamens exceeding the corolla; leaves with scabrous margin, mostly shorter than internodes (a high-mountain plant) . . . . . 9. *H. ferganensis* Boriss.
- + Inflorescence unbranched, elongate, (5) 7–12 cm long; calyx green or dark blue; two stamens about equaling the corolla, the other two longer . . . . . 8.
8. Plants 40–50 cm high, sparingly leafy; leaves 1–3.5 cm long, 1–3 mm broad; inflorescences with distant verticillasters, loose, to 1.5 cm broad; floral leaves about equaling the peduncles; nutlets with several distinct nerves on the back and a sharp rib on the other side (Tien Shan) . . . . . 3. *H. tianschanicus* Boriss.
- + Plants 25–35 cm high, densely leafy; leaves 2–6 cm long, 1–2 mm broad, narrowly linear; inflorescences dense, to 1 cm broad; floral leaves upright, exceeding peduncles; nutlets flattish, without a sharp rib and not distinctly nerved on the back (W. Tarbagatai, Dzungarian Alatau, W. Altai) . . . 4. *H. ambiguus* (Trautv.) Iljin.

Series 1. *Officinales* Boriss. — Calyx 8–10 mm long; corolla with a short tube, slightly exserted:

- 451 1. *H. officinalis* L. Sp. pl. (1753) 569, s. str.; Ldb. Fl. Ross. III, 356, p. p.; DC. Prodr. XII, 251, p. p.; Boiss. Fl. or. IV, 584; Shmal'g. Fl. II, 310, p. p.; O. and B. Fedch. Perech. rast. Turk. V, 131. — *H. alopecuroides* Fisch. in DC. Prodr. XII (1848) 252. — *Ic.*: Fedch. and Fler. Fl. Evrop. Ross., Fig. 753; Syreishch. Fl. Mosk. gub. III, 89; Varlikh, Russk. lekarstv. rast. Plate 95; Borisova in Bot. mat. gerb. Bot. inst. AN SSSR, XII, 255, Fig. 2, 2 a–c. — *Exs.*: Fl. It. exs. No. 1948; Fl. Gal. et Germ. exs. No. 282.

Subshrub, 20–50 (80) cm high; stems mostly branching, subglabrous, rarely short-pubescent; leaves subsessile, lanceolate to linear-lanceolate, 2–4 cm long, 5–10 mm broad, with a prominent midvein beneath, the slightly revolute margins roughened with short hairs; floral leaves obtuse; verticillasters axillary, 3–7-flowered, the lower distant, often one-sided, forming elongate oblong spikelike inflorescences; bracts obtuse; calyx often colored, the lanceolate acuminate teeth about half the length of the tube; corolla dark azure, lilac, pink or white; tube of corolla barely exserted; two stamens greatly exceeding the corolla, the other two somewhat shorter; nutlets oblong-ovoid, trigonous, ca. 2.5 mm long, 1 mm broad, attenuate, dark brown on one side, naked, minutely tuberculate, with a sharp rib. July–September.

Cultivated in gardens; sometimes escaped and occurring as a weed; indigenous in the mountains of S. Europe. — European part: Balt. (Estonia), U. Dnp., M. Dnp., V.-Don, L. Don, Bl., Crim.; E. Siberia: Dau. *Gen. distr.*: S. Europe; introduced into N. Am. Described from S. Europe. Type in London.



**Economic importance.** The essential oil produced by this plant contains pinocamphene and ketones; the plant contains traces of alcohol, tannin, acetic acid, tar, and other substances. The yield of oil is 0.07 to 0.29% from fresh plants, 0.3 to 0.9% from dry material. Used in liqueur production. Ornamental.

Series 2. *Angustifolii* Boriss. — Calyx with long lanceolate or subulate-pointed teeth; corolla with a long tube, prominently exserted.

2. *H. angustifolius* M. B. Fl. taur.-cauc. II (1808) 38 et III (1819) 389; C. A. M. Enum. pl. cauc.-casp. 91; Grossg. Fl. Kavk. III, 333. — *H. orientalis* Adams ex Willd. Enum. hort. Berol. (1809) 599. — *H. caucasicus* Spreng. in Steud. Nomencl. bot. ed. 1 (1840) 423. — *H. officinalis* var.  $\gamma$ . Ldb. Fl. Ross. III (1846–1851) 357. — *H. officinalis*  $\beta$ . *angustifolius* Boiss. Fl. or. IV (1879) 584; Shmal'g. Fl. II, 310, p. p. — Ic.: Fedch. and Fler. Fl. Evrop. Ross., Fig. 754; Beg. et Dir. Contr. Fl. Arm. 452 tab. 6; Borisova in Bot. mat. gerb. Bot. inst. AN SSSR, XII, 261, Fig. 5, 2a–g. — Exs.: Fl. Cauc. exs. No. 272; Pl. or. exs. No. 147.

Subshrub, 30–40 cm high; stems numerous, 4-angled, virgate, covered with short crisp retrorse hairs; leaves narrowly linear, 1.5–2 (3.5) cm long, 1–2 (3) mm broad, spreading, often revolute-margined, with a prominent midrib, sparsely short-pubescent, subacute; inflorescences terminal spikelike, dense, secund, 3–6 cm long; verticillasters axillary, 2–6-flowered, peduncles half length of calyx; bracts filiform-linear, equaling the pedicels; calyx 7–8 mm long, tubular-conical, prominently nerved, mostly violet, the teeth lanceolate, acuminate, shorter than or sometimes nearly as long as the tube; corolla violet-blue, 10–12 mm long, the tube ca. 8 mm long; upper lip shallowly 2-lobed; lower lip longer, 3-lobed, the middle cordate, the lateral ovate; two stamens slightly exceeding the corolla, the other two much longer and equaling the style; nutlets ovoid-trigonus, 2 mm long, 1 mm broad, dark brown, naked, with a sharp rib. July–October.

Rocks and dry stony slopes, at altitudes from 1000 to 2100 m. — Caucasus: Dag., E. and S. Transc. **Gen. distr.:** Bal.-As. Min. (E. Anatolia), Arm.-Kurd. Described from the Caucasus. Type in Leningrad.

**Note.** Incorrectly reported for Crimea by Bieberstein, Stankov, Taliev, and others. The reports most probably refer to *Satureia taurica* Velen.

**Economic importance.** Contains essential oil; used for flavoring food.

3. *H. tianschanicus* Boriss. in Bot. mat. gerb. Bot. inst. AN SSSR, XII (1950) 254. — *H. officinalis* auct. fl. As. Med. — Ic.: Borisova, op. cit. 255, Fig. 2, 1 a–e.

Subshrub, 40–50 cm high; stems virgate, 4-angled, glabrous; leaves linear, 1–3.5 cm long, 1–3 mm broad, subglabrous, with very scant short hairs, acute, revolute-margined; inflorescence slender, 5–7 cm long, 0.5–1.5 cm broad, loose in lower part; verticillasters 455 distant, 4–6-flowered; peduncles shorter than calyx; calyx 5–6 mm long, mostly tinged with blue, the teeth triangular, acute, half the length of the tube; corolla bluish-violet, ca. 10 mm long, the narrow tube ca. 5 mm long; lips of equal length, the upper ovate, the lower 3-lobed, its middle lobe 2–3 mm broad, much narrower than the lateral lobes; two stems

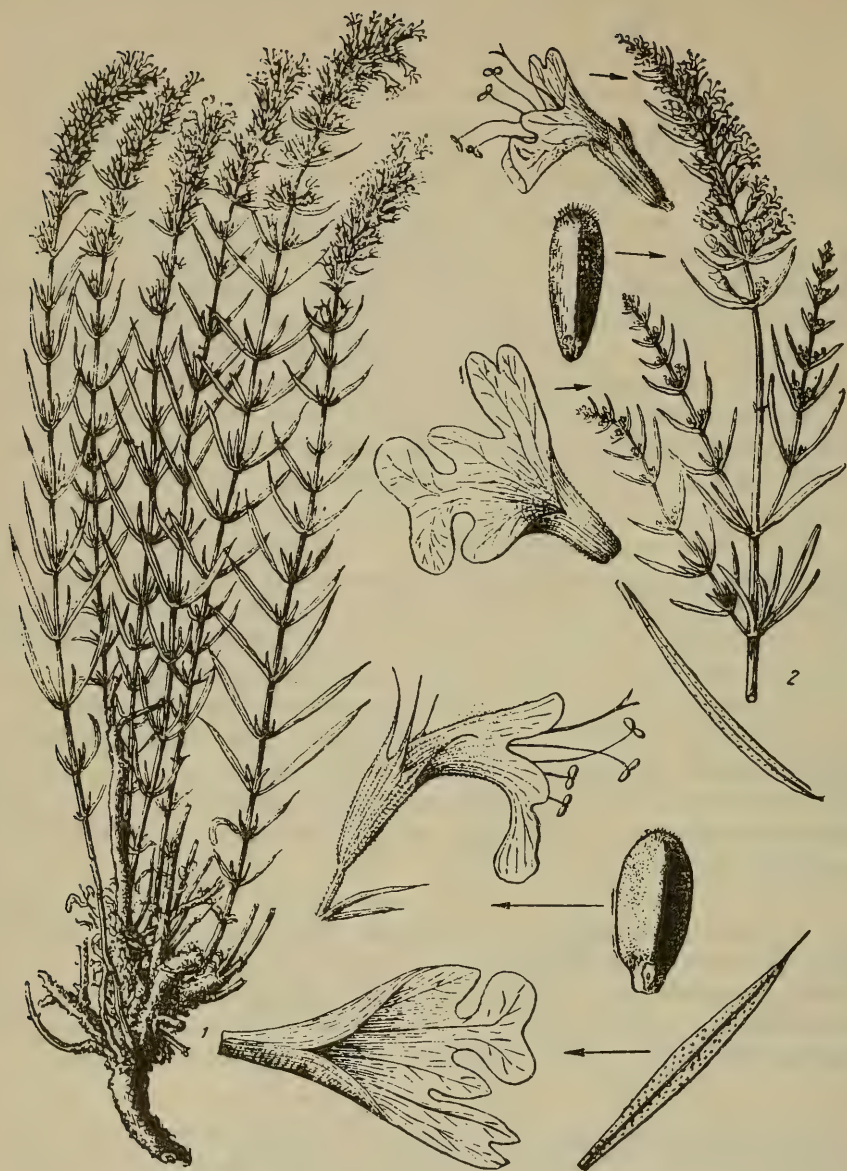


PLATE XXIV. 1 – *Hyssopus cuspidatus* Boriss., general aspect, flower, corolla, nutlet, leaf;  
 2 – *H. cretaceus* Dub., upper part of stem, flower, corolla, nutlet, leaf.

equaling the corolla, two longer; style exserted; nutlets 2 mm long, 1 mm broad, oblong, naked, obscurely glandular at apex, with 2–4 nerves on the back and a sharp rib on the ventral side. July–September.

Stony slopes, pebbly and gravelly soils, taluses and steppe plots. — Centr. Asia: T. Sh. (Chatkal' range, Talaskii Alatau, Kirgizian Alatau, Uzun-Akhmat range). Endemic. Described from Koksu pass. Type in Leningrad.

4. *H. ambiguus* Iljin from Prokhorova and Lebedev, Dushistye rasteniya Altaya (1932) 35, pro minima parte; Kryl. Fl. Zap. Sib. IX, 2380; Borisova in Bot. mat. gerb. Bot. inst. AN SSSR, XII 254. — *H. officinalis* var. *ambiguus* Trautv. in Bull. Soc. Nat. Mosc. 39, 2 (1866) 447; Kryl. Fl. Alt. IV, 1016. — Ic.: Borisova, op. cit., Fig. 3, 2a–d.

Subshrub; stems 25–35 cm long, densely leafy, flexuous, numerous, woody at base, 4-angled in lower part, branching from base; leaves glabrous, narrowly linear, 2–6 cm long, 1–2 mm broad, mostly exceeding the internodes, with a prominent midvein beneath, acute; inflorescences slender, (5) 10–12 cm long, ca. 1 cm broad, attenuate toward summit, dense, many-flowered, unbranched; floral leaves upright, exceeding the semiverticels, the upper to 1 cm long, the lower to 3 cm; semiverticels 5–6-flowered; calyx ca. 5 mm long, green or blue, the acuminate teeth ca. 1 mm long; corolla azure-blue, ca. 10 mm long, twice length of calyx; lips about same length, the upper 2-lobed with obtuse ovate lobes, the lower 3-lobed, its middle lobe obsolescent, the lateral lobes developed, obtuse; two stamens exserted, two as long as corolla; style equaling the longer stamens; nutlets naked, ca. 2 mm long, ca. 1 mm broad, oblong, flat, without a sharp rib, brown. August.

Mountain slopes. — W. Siberia: Alt. (Leninsk and Emeinogorsk areas); Centr. Asia: Dzu.-Tarb. (W. Tarbagatai, Lepsa distr.). Endemic. Described from the river Khatynsu in Tarbagatai. Type in Leningrad.

Note. See note to *H. macranthus* Boriss.

5. *H. cuspidatus* Boriss. in Bot. mat. gerb. Bot. inst. AN SSSR, XII (1950) 256, 261, Fig. 5, 1a–e.

Subshrub; stems numerous, branching, woody high up from base, 4-angled, 30–50 cm high, glabrous or nearly so; leaves linear, 1–4 cm long, 1–3 mm broad, attenuate to a subulate subdeciduous cusp; cauline and floral leaves with hispidulous non-revolute margins; inflorescences 5–8 cm long, many-flowered, the lower semiverticels distant; peduncles 2–3 mm long; bracts linear, subulate-pointed; calyx 8 mm long, tubular, the teeth triangular, half the length of the tube, terminating in a subulate cusp nearly as long as the tooth; corolla ca. 11 mm long, with a short tube; upper lip with 2 acute lobes; lower lip 3-lobed, the emarginate middle lobe slightly exceeding the lateral lobes; two stamens exserted, two about as long as corolla; style greatly exceeding the corolla; nutlets trigonous-oblong, 2 mm long, 0.75 mm broad, glandular at apex, with a sharp rib, brown. July–September. (Plate XXIV, Figure 1.)

Needlegrass-fescue steppes, stony slopes, on pebbles, granite outcrops, at altitudes up to 1450 m. — W. Siberia: Alt. (Naryn range); Central Asia: Dzu.-Tarb. (Saur, Dzungarian Alatau). Gen. distr.: Mong. (Mongolian Altai). Described from the river Kurchum in Naryn range. Type in Leningrad.



Note. Distinguishable from all other species growing in the U.S.S.R. by the cusps terminating the leaves, bracts and calyx-teeth. *Hyssopus pilifer* Griseb., growing in the northern part of the Balkan Peninsula and in Hungary, has leaves and bracts terminating in cusps 3–5 mm long, but its calyx-teeth are not cuspidate.

Series 3. *Cretacei* Boriss. — Calyx small, 4–5 mm long, with short obtusish teeth; corolla small, ca. 10 mm long, with a short tube; stems terete; nutlets hairy at apex.

6. *H. cretaceus* Dub. in Sched. Herb. Fl. Ross. V (1905) 51; Fedch. and Fler. Fl. Evrop. Ross. 831. — *H. officinalis* L. var.  $\alpha$ . Ldb. Fl. Ross. III (1847–1849) 357, p. p. — *H. officinalis* var. *wolgensis* Briq. in Pflanzenfam. IV (1897) 306. — *H. officinalis tanaicensis* Fisch. in Catal. hort. Gorenk. (1812) 22, nomen nudum. — *H. tanaicensis* (Fisch.) Dub. in Izv. Bot. sada, III (1903) 220, nomen nudum. — *H. angustifolius* Litv. Gerb. zam. (1891) 48, non M. B. quoad pl. cretaceam. — *H. officinalis* var. *angustifolius* Schmalh. Fl. II (1897) 310, p. p. — Ic.: Fedch. and Fler. op. cit., Fig. 755; Borisova in Bot. mat. gerb. Bot. inst. AN SSSR, XII, 255, Fig. 2, 3a–e. — Exs.: GRF, No. 1338, 1339.

Subshrub, with a stout woody root, 20–45 (60) cm high, woody from base; stems terete, sparsely covered in upper part with recurved hairs, glaucous, flexuous, ascending or partly decumbent, densely leafy; leaves narrowly linear, 2–4 cm long, 2–3 mm broad, thickish, flat, grayish-green, the margins not revolute, the midrib indistinct; inflorescences dense, compact, many-flowered, 5–10 (20) cm long; flowers in 3–7-flowered semiverticels in the leaf axils, on peduncles ca. 7 mm long; bracts small, linear, half the length of pedicels; calyx tubular-campanulate, 4–5 mm long, green, greenish or dingy violet, the teeth triangular, one-third the length of the tube; corolla blue, sometimes white, sparsely pubescent, with curved tube, ca. 10 mm long; upper lip ovate, 2-lobed; lower lip somewhat longer, 3-lobed, the middle emarginate lobe slightly larger than the broad-ovate lateral lobes, with toothed margin; stamens subequal, two of them slightly exceeding the corolla, the anthers dark, divergent; nutlets pubescent on one side, with a hairy coma at apex, ca. 2 mm long, less than 1 mm broad, trigonous-oblong. May–August (September). (Plate XXIV, Figure 2.)

Chalky slopes of hills and outcrops in the forest-steppe and steppe zones. European part: V.-Don, L. V., L. Don, Bl. (in Dnieper and Donets basins). Endemic. Described from Titarovka in Starobel'sk district. Type in Leningrad.

Series 4. *Macranthi* Boriss. — Calyx ca. 6 mm long, the teeth broadly triangular, one-third the length of the tube; corolla ca. 15 mm long, greatly exceeding the calyx, the lower lip with a very large emarginate middle lobe; stamens to 2 cm long.

7. *H. macranthus* Boriss. in Bot. mat. gerb. Bot. inst. AN SSSR, XII (1950) 260. — *H. ambiguus* Iljin from Prokhorova and Lebedev, Dushistye rasteniya Altaya (1932)

35, nomen, pro parte; Kryl. Fl. Zap. Sib. IX, 2380. — *H. officinalis* var. *ambiguus* Kryl. Fl. Alt. IV (1907) 1016, non Trautv. — *H. officinalis* Bge. in Ldb. Fl. alt. II (1830) 398, non L.; Ldb. Fl. Ross. III, 356, p. p. — Ic.: Borisova, op. cit. 257, Fig. 3, 1a–e. — Exs.: Smirnov, Pl. alt. exs. No. 74.

Subshrub; rhizome 5–10 mm thick, woody, branched; stems numerous, erect, simple or branching, smooth, 15–45 cm high; leaves subsessile, linear, 2–4 cm long, 1–3 mm broad, acute, slightly narrowed at base, smooth, usually with revolute margin beset with short prickly hairs; semiverticels 3–6-flowered, in the axils of upper leaves, short-peduncled; inflorescences at ends of stems, 2–10 cm long, dense, sometimes loose in lower part, with solitary flowers in the leaf axils; bracts linear-subulate; pedicels short-haired, shorter than calyx; calyx ca. 6 mm long, with short hairs on the nerves and at margin of the broadly triangular acute teeth, these about one-third the length of the tube; corolla ca. 15 mm long, twice length of calyx, bluish-violet, pubescent outside; upper lip subovate, scarcely emarginate, with short half-rounded lobes in upper part; lower lip much longer, 3-lobed, the middle lobe broadly obcordate, narrowed at base to a broad claw, twice as long and broad as the lateral lobes; stamens much exerted, subequal; nutlets smooth, yellowish-brown, 2 mm long, 1 mm broad, oblong, sharply keeled, hairy at apex. July–August. (Plate XXV, Figure 2.)

Solonetzc flood plains, exposed stony and gravelly slopes of hills and low mountains in the Kazakh area of low rounded hills, more rarely plain steppes, granite rocks, coarse sandy soils, pebbles, and gravelly bald mountains. — W. Siberia: Irt., Alt. (near Ust'-Kamenogorsk); Centr. Asia: Ar.-Casp., Balkh. Endemic. Described from Ak-molinsk. Type in Leningrad.

Note. *H. ambiguus* (Trautv.) Iljin sensu stricto, with which this species is confounded, is distributed in the mountains of N. W. Altai, western part of Tarbagatai and Leninsk area. It differs not only morphologically but apparently also in chemical composition. *H. macranthus* Boriss. has an agreeable scent as opposed to the unpleasant scent of *H. ambiguus* (Trautv.) Iljin. The oil of *H. macranthus* Boriss. differs in composition from oil obtained from *H. cretaceus* Dub. and *H. officinalis* L. (references are listed in "Dushistyie rasteniya Altaya" by Prokhorova and Lebedev).

Series 5. *Oblongi* Boriss. — Calyx with short triangular teeth; corolla 10–11 mm long; middle lobe of lower lip equaling or much narrower than the lateral lobes; leaves mostly shorter than internodes, oblong-lanceolate or oblong; inflorescences short.

8. *H. seravschanicus* (Dub.) Pazij in Ind. sem. hort. Bot. Univ. As. Med. (1945) 4; Borisova in Bot. mat. gerb. Bot. inst. AN SSSR, XII, 254. — *H. officinalis* L. var. *seravschanicus* Dub. in O. and B. Fedch. Perech. rast. Turk. V, 131. — Ic.: Borisova, op. cit. 259, Fig. 4, 2a–d.

Subshrub, (20) 25–50 cm high; stems woody in lower part, sharply 4-angled, sparsely covered with short stiff hairs; leaves 1–2.5 cm long, 3–5 mm broad, shorter than internodes, oblong-lanceolate or oblong, with a distinct midvein beneath, revolute-margined,



PLATE XXV. 1 – *Hyssopus seravschanicus* (Dub.) Pazij, upper part of stem, flower, corolla, nutlet, leaf; 2 – *H. macranthus* Boriss., general aspect, flower, corolla, leaf, nutlet.



461 the lower obtuse, short-petioled, the upper subobtuse, sessile; inflorescences dense, many-flowered, terminal, 1.5–3 cm long; bracts sometimes subulate-pointed; calyx dark violet, sometimes nearly black, ca. 9 mm long, the teeth one-third the length of the tube, acuminate, sometimes briefly subulate-pointed; corolla 10–11 mm long, the tube 7–8 mm long; lips subequal, the upper 2-lobed, ovate; middle lobe of lower lip ca. 3 mm broad, narrower than the rounded-ovate lateral lobes; two stamens markedly exceeding the corolla, two somewhat shorter; style equaling the longer stamens; nutlets light brown, 2 mm long, ca. 1 mm broad, oblong, naked, with an obtuse rib. June–September. (Plate XXV, Figure 1.)

Stony slopes, pebbles, gravelly taluses, from the wood and scrub to the subalpine zone, at 1400 to 3100 m. — Centr. Asia: Pam.-Al. **Gen. distr.:** Iran (in adjacent parts of Afghanistan). Described from Zeravshan. Type in Leningrad.

**Economic importance.** Plants with a strong, unpleasant camphoric odor. Oil output ranges from 0.64 to 0.76% (the highest of any hyssop species), used mainly in soap production.

9. *H. ferganensis* Boriss. in Bot. mat. gerb. Bot. inst. AN SSSR, XII (1950) 262. — *H. officinalis* auct. fl. As. Med. — Ic.: Borisova, op. cit. 259, Fig. 4, 1a–e.

Subshrub, 30–40 cm high; stems sharply 4-angled, glabrous, many-flowered, woody at base; leaves mostly shorter than internodes, 1.5–2.5 cm long, 1.5–4 mm broad, subacute, with rough revolute margins, with a prominent vein beneath; inflorescences branched in lower part; verticillasters 5–10-flowered in the leaf axils, on peduncles to 1 cm long; upper flowers forming one-sided terminal inflorescences 1–5 cm long, 1–2 cm broad, the lateral ramifications 1 cm broad; floral leaves not exceeding the flowers; calyx bright rose-lilac, campanulate, ca. 6 mm long, the teeth unequal, broad, triangular, acute, ca. 1 mm long; corolla blue (?), ca. 1 cm long, the tube slightly longer than calyx; upper lip as long as or slightly longer than the lower, entire or scarcely emarginate, ovate; middle lobe of lower lip entire, about as broad as the lateral lobes; all stamens exceeding the corolla, two of them slightly shorter; style as long as the longer stamens; nutlets ca. 3 mm long, 1 mm broad, trigonous-oblong, naked, smooth, keeled on one side. July–August.

Rocks, ravines, passes, at altitudes between 1800 and 2500 m. — Centr. Asia: T. Sh. (Fergana range). Endemic. Described from the Andizhan district. Type in Leningrad.

462 Subtribe C. Thyminae Briq. in Pflanzenfam. IV, 3a (1897) 208 et 306. — Calyx campanulate or tubular, (5) 10–13-nerved, bilabiate (of the  $\frac{3}{2}$  type), rarely almost regular; corolla bilabiate, with flat lobes; stamens 4, the filaments spreading from base, straight. Herbs, subshrubs or shrubs.

Genus 1297.\* *Majorana*\*\* Moench

Moench, Meth. pl. (1794) 406

Inflorescence short, spiciform; calyx short-campanulate or infundibular, oblique, small, with a deep naked throat; upper lip of calyx almost entire or obscurely notched, sometimes wanting; corolla equaling the calyx, nearly 2-lipped, with a short tube; upper lip suberect, emarginate; lower lip 3-lobed, with subequal lobes; stamens 4, exserted or included, distant, the lower longer; anthers bilocular, with parallel or divergent locules; style-branches subequal; nutlets ovoid, smooth. Perennial herbs with lignified base or subshrubs, densely pubescent, often tomentose; leaves entire or toothed; bracts orbicular, hairy, not colored, flat, equaling the calyx and imbricately appressed to it.

A Mediterranean genus, comprising about six species, mostly distributed in the E. part of the Mediterranean region. Represented in the U.S.S.R. by one species, cultivated as an aromatic herb and for use as condiment.

1. *M. hortensis* Moench, Meth. pl. (1794) 406; Benth. Lab. Gen. et sp. 338; Briq. in Pflanzenfam. IV, 3a (1897) 307. — *Origanum majorana* L. Sp. pl. (1753) 530; DC. Prodr. XII, 195; Shmal'g. Fl. II, 309. — *O. majoranoides* Willd. Sp. pl. III (1800) 137. — *O. wallichianum* Benth. in Wall. Pl. As. rar. I (1830) 31. — *O. onites* Lam. Encycl. IV (1797) 608, non DC. — *Amaracus majorana* Schinz et Thell. in Bull. Herb. Boiss. II, VII (1907) 576. — *Majorana crassa* Moench, Meth. pl. (1794) 406. — Ic.: Hegi, III. Fl. V, 4, tab. 229, 3.

Annual or biennial; stems erect, branching, 20–45 (50) cm high, woody at base, silvery-gray all over; leaves petiolate, oblong-ovate, 1.2–1.5 (to 2.5) cm long, 7–8 mm broad, or spatulate, obtuse, entire, gray-tomentose on both sides; bracts appressed to calyx, imbricate; inflorescences oblong, tomentose-villous, composed of 3–5 sessile  
463 short ovoid spicules borne at ends of branches; flowers small; calyx short-campanulate; corolla ca. 4 mm long, equaling the calyx-tube, reddish, pink or white. July–August.

Widely grown. In cultivation since antiquity. Growing wild in Asia Minor, Arabia, Egypt, and westward to Tripolitania. Naturalized in other Mediterranean countries. In cultivation mostly in hot and temperate climates. — European part: cultivated in Balt., M. Dnp., Crim.; Centr. Asia: Syr D. (Tashkent, Chingan), Mtn. Turkm. Gen. distr.: S. Europe, Med.

Note. Grown in ancient times in Egypt, Greece and Rome as a medicinal plant. Now cultivated for its essential oil. Used as condiment in food products and preserves; it is also employed for flavoring liqueurs. Nectariferous, giving an abundant flow of honey. Used medicinally for its stomachic, tonic and anticatarrhal properties. Beside the fragrant essential oil, the herbage contains marjoram camphor, terpinene and terpineol.

\* Treatment by A. G. Borisova.

\*\* A name of Arab derivation.

Genus 1298.\* *Origanum*\*\* L.

L. Sp. pl. (1753) 588

Calyx campanulate, 13-nerved, subequally 5-toothed, with a ring of hairs in throat; corolla bilabiate, slightly exserted, white or rose-purple; upper lip erect, flat, emarginate; lower lip equally 3-lobed; stamens 4, shorter than upper lip or slightly exserted; anthers separated by a triangular connective; anther-locules subparallel; style with subequal branches; nutlets dry, ovoid, smooth. Perennial herbs with entire or toothed oblong-ovate leaves; flowers 1–3 in the axils of approximate and closely imbricated bracts, aggregated in spicules, these forming a paniculate or umbellate-corymbose inflorescence; bracts imbricated, often colored, covering the calyx.

The genus contains about 10 species, distributed mainly in the Mediterranean region.

1. Inflorescence a corymbiform spreading panicle or compactly corymbiform, composed of cylindrical or oblong many-flowered spicules; leaves mostly large, 2–4 cm long, sparsely glandular (mainly beneath), the glands deeply embedded in dry leaves; plants mostly glabrate, rarely pubescent; bracts, calyx and sometimes also leaves violet-tinged, more rarely green; flowers 5–8 mm long, pink or purple, rarely white. Widely distributed in the U.S.S.R. except Pam.-Al. and W. T. Sh. . . . . 1. *O. vulgare* L.
- 464 + Inflorescence paniculate, divaricately branched, with few-flowered spicules; leaves 10–15 cm long, prominently glandular on both sides; stems and leaves mostly hairy; bracts, calyx and leaves mostly light green; flowers 3.5–5 mm long, white or pale violet . . . . . 2.
2. Calyx subglabrous, rarely pubescent (var. *seravschanica* Boriss.), with triangular-lanceolate teeth; corolla 3–4.5 mm long; flowers pedicellate or sessile (var. *seravschanica* Boriss.); leaves subglabrous, obtusish (var. *seravschanica* Boriss.), ovate-elliptical to orbicular, profusely covered on both sides with reddish punctate glands (Pam.-Al., W. T. Sh.) . . . . . 2. *O. tyttanthum* Gontsch.
- + Calyx hispidulous, with broadly triangular teeth; corolla ca. 5 mm long; flowers sessile; leaves ovate, short-cuneate, obtuse, hispidulous on both sides, with sparse obscure yellow glands (Kopet Dag) . . . . . 3. *O. kopetdaghensis* Boriss.

1. *O. vulgare* L. Sp. pl. (1753) 590; M. B. Fl. taur.-cauc. II, 57; DC. Prodr. XII, 193; Ldb. Fl. Ross. III, 343; Benth. Lab. Gen. et. sp. 335; Boiss. Fl. or. IV, 551; Shmal'g. Fl. II, 309; Grossg. Fl. Kavk. III, 333. — *O. hirtum* Link, Enum. pl. Berol. 2 (1822) 114; Benth. in DC. op. cit.; Shmal'g. op. cit. 309. — *O. pruinatum* C.Koch in Linnaea, XXI (1848) 663. — *O. parviflorum* D'Urv. Enum. pl. or. VIII (1822) 71; Shmal'g. op. cit. 309; Grossg. op. cit. 333. — *O. angustifolium* C. Koch, l. c. 661. — *O. gracile* C. Koch, l. c. — *O. albiflorum* C. Koch, l. c. 662. — *O. vulgare* var. *prismaticum* Gaud. Fl. helv. 4 (1829) 78. — *O. virens* Link ex C. A. M. Enum. pl.

\* Treatment by A. G. Borisova.

\*\* An ancient name, used by Dioscorides and other classical authors.



cauc.-casp. (1831) 90. — *O. creticum* L. Sp. pl. (1762) 823; Grossg. Opređ. rast. Kavk. 346. — Ic.: Fedch. and Fler. Fl. Evrop. Ross. 756; Syreishch. Fl. Mosk. gub. III, 77; Hegi, III. Fl. V, 4, tab. 229, 4, fig. 3219. — Exs.: GRF, No. 986.

Perennial, scabrous or subglabrous; rhizome oblique; stems 30–60 (90) cm high, erect, often branching at base, sometimes purple-tinged and pubescent; leaves petio-  
late, oblong or oblong-ovate, acute, 2–4 cm long, remotely small-toothed, light green  
beneath, sparsely glandular mostly beneath, almost eglandular above; inflorescences  
465 corymbose-paniculate, spreading, many-flowered, to 15 cm long and to 10 cm broad,  
composed of cylindrical-oblong or oblong-lanceolate spicules, these elongating in fruit;  
bracts longer than calyx, ovate-elliptical or oblong, acute, usually dark purple (like  
calyx and many upper leaves) more rarely green; calyx ca. 3 mm long, glabrous or  
with sparse hairs, the teeth triangular-lanceolate, two-fifths to one-half the length of the  
tube, the ring of hairs in throat nearly equaling the teeth; corolla 5–10 mm long, light  
purple or lilac-rose, sometimes white, the tube exserted; two stamens exserted, the  
other two shorter; style exserted; nutlets orbicular, brown in maturity, naked, ca.  
0.5 mm long, obtusely 3-angled. June–September.

Scrub, hills, sunny grass-covered slopes, glades and steppe meadows. In the Cauca-  
sus, one of the most widespread plants in the forest and subalpine belts. — European  
part: Kar.-Lap., Lad.-Ilm., Dv.-Pech., Balt. (Estonia), V.-Kama, V.-Don, Transv., U. Dns.,  
M. Dnp., L. Don, Bl., Crim.; Caucasus: throughout; W. Siberia: U. Tob., Irt., Alt.,  
Ang.-Say., Dau.; Far East: introduced; Centr. Asia: Ar.-Casp., Balkh., T. Sh. (Centr.  
and E.). Gen. distr.: Atl. and Centr. Eur., Med., Dzu.-Kash., Kuldja. Described from  
Europe. Type in London.

Note. A polymorphic boreal species, ecologically associated with the forest-steppe  
belt, forming various colored and green forms. There are variations in leaf size, shape  
of inflorescence, size and color of corolla. Elongation of the spicules in fruit (var.  
prismaticum Gaud.) occurs sometimes in all species of this genus and it can apparent-  
ly be observed in autumnal forms. There is a distinct race in the Caucasus, var. tauri-  
cum Boriss., with compact inflorescence, orbicular or rounded-ovate leaves, and  
flowers crowded at ends of short branches.

Economic importance. An abundantly nectariferous plant: a hectare planted to  
common marjoram yields 330 kg of nectar, with a sugar content of 118 kg, and this  
represents a honey yield of 169 kg (Kuliev). The plant is rich in vitamins. The seeds  
contain up to 29.15% fatty oil which is of value for the pharmaceutic industry. Fresh  
herbage yields 0.7–0.2 essential oil (the yield from dried herbage is 0.15–0.4%). This  
oil, with a pleasant scent and a bitter, spicy, somewhat astringent taste, contains up  
to 50% thymol and other ingredients. It is used in manufacture of Eau de Cologne  
and soap. Also used in the food industry, in production of liqueurs and brandies.  
The aromatic leaves are used for flavoring kvass and cucumber pickling. A fermenting  
agent. A dye contained in the flowers imparts an orange-red color to wool; the leaves,  
flowers and stems give a black color with coppers. A medicinal plant for external  
466 (rarely internal) application; used for aromatic baths, compresses and as analgesic.

Distinct forms of *O. vulgare* are associated with different habitats; beside mor-  
phological differences, they also differ among each other in scent.

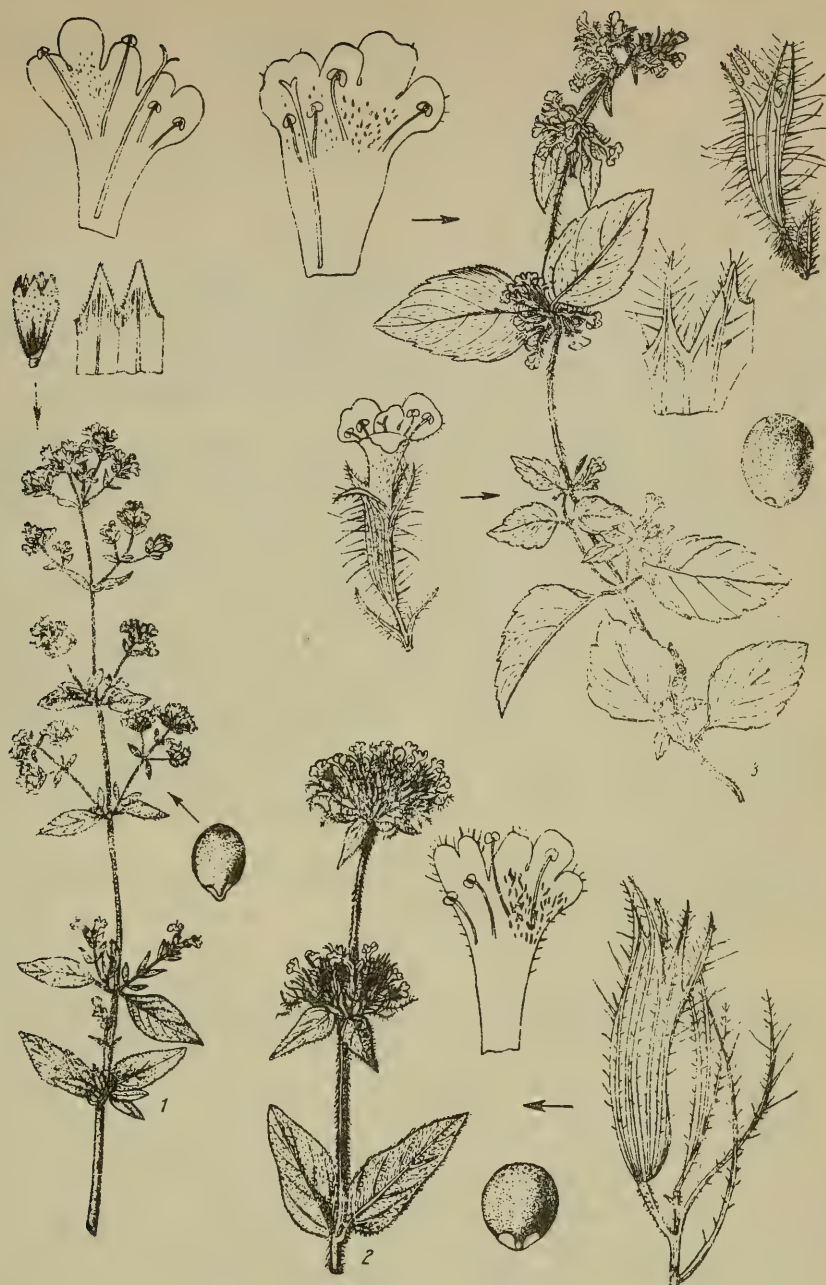


PLATE XXVI. 1 — *Origanum tyttanthum* Gontsch., upper part of stem, corolla calyx, fragment of calyx from inside, nutlet; 2 — *Clinopodium integerrimum* Boriss., upper part of stem, corolla, calyx with bracts, nutlet; 3 — *C. umbrinum* (M.B.) C. Koch, upper part of stem, corolla, flower, calyx, fragment of calyx from inside, nutlet.

2. *O. tyttanthum* Gontsch. in Delect. Sem. Inst. bot. sect. Tadschik. Acad. Sc. URSS (1934) 12. — *O. vulgare* auct. As. Med. p. p.

Perennial, 35–85 cm high; stems sparsely short-pubescent or subglabrous; leaves 10–15 (40) mm long, ovate-elliptical or oblong, cuneate at base, acute or subacute, subglabrous, densely covered with distinct punctate reddish glands, setiform-ciliate on midrib and at margin, entire; inflorescence paniculate, broad, with long slender spreading branches, narrow, ovoid or oblong in outline; flowers pedicellate, in loose many-flowered umbelliform spicules, these elongating in fruit to 1.7 cm; bracts elliptical, acute, at anthesis slightly longer than calyx, in fruit shorter; calyx campanulate, ca. 3 mm long, punctate-glandular, subglabrous, the teeth two-fifths to one-half the length of the tube, ca. 1 mm long at anthesis, the ring of hairs not exerted, half the length of the tube; upper lip of corolla 2-lobed, emarginate, with broad lobes; lower lip slightly longer, with 3 subequal rounded lobes; style slightly exerted; nutlets ovoid, 0.75 mm long, 0.5 mm broad, smooth, naked, almost without a keel, obsoletely 3-angled. July–August. (Plate XXVI, Figure 1.)

One of the main components of the mountain flora in Tadzhikistan and Uzbekistan. Growing chiefly in the middle mountain belt, among the wood and scrub vegetation and in the subalpine zone, on fine earth and gravelly soils. — Centr. Asia: T. Sh. (W.), Pam.-Al. Described from Tadzhikistan. Type (lectotype) in Leningrad.

469 Note. A polymorphic species, widely distributed in Soviet Central Asia; it differs from *O. vulgare* L. in shape of inflorescence, size of flowers and abundance of glands.

A distinct var. *seravschanicum* Boriss., growing in Zeravshan basin and in Zeravshan and Turkestan ranges, is distinguished by compact rounded spicules, sessile flowers, larger subglobose nutlets (to 1 mm long), and densely-haired lanceolate-toothed calyx.

**Economic importance.** Nectariferous. Essential oil containing phenol and thymol, the yield ranging from 0.3 to 0.57%: in Gissar range 0.17–0.37%, in Kirgiz and Talasskii Alatau 0.4 to 0.57%, in Chatkal' range 0.08 to 0.2% (Kudryashev). The oil is used in soap production.

Medicinal, used in home treatment as carminative (Fergana); the seeds mixed with honey are also used as a popular medicament.

3. *O. kopetdaghensis* Boriss. sp. n. in Bot. mat. gerb. BIN AN SSSR, XVI (1954).

Perennial, densely hirtellous, 30–50 cm high; stems numerous, slender, erect, sparingly branched; leaves ovate or ovate-oblong, 10–15 mm long, 5–10 mm broad, remotely and obscurely toothed, covered on both sides with few indistinct punctate yellow glands and sparse short stiffish white hairs, short-cuneate at base, the petiole 5–10 mm long; inflorescence a long loose panicle, with loose few-flowered spicules at ends of sparsely leafy inflorescence branches; flowers sessile; bracts ovate, subacute, small, slightly exceeding calyx, green; calyx hispidulous, 2–3 mm long, green, broadly campanulate, with dense long hairs in throat, the teeth broadly triangular-lanceolate, one-third to one-half the length of the tube; corolla small, 5 mm long, pubescent and punctate-glandular outside; upper lip emarginate-bilobate; lower lip slightly longer, 3-lobed, the middle lobe the largest; two stamens exerted, two equaling the corolla; style slightly exerted; nutlets unknown. June–August.



Mountain slopes in the steppe belt. — Centr. Asia: Mtn. Turkm. (Kopet-Dag). Endemic. Probably occurring also in the adjoining parts of Iran. Described from Mt. Chokh-Agach in W. part of Kopet-Dag range. Type in Leningrad.

470 Genus 1299.\* *Thymus*\*\* L.

L. Sp. pl. 1 (1753) 590

Calyx with cylindrical or campanulate 10 (13)-nerved tube; lower lip 2-parted to base, the narrow ovate lobes always ciliate; upper lip broad, spreading, 3-toothed to  $\frac{1}{3}$ — $\frac{1}{2}$  its length, the teeth lanceolate or triangular, with ciliate or minutely setiferous (rarely smooth) margin, the throat with a ring of straight setiform hairs at base of limb; corolla with short or fairly elongated tube and 2-lipped limb, lilac, pink or white, the upper lip notched at apex, the lower 3-lobed, spreading; stamens 4, straight, divergent from base; anthers bilocular, with a rather broad connective; style branches subulate; nutlets ellipsoid or subglobose. Subshrubs with decumbent or ascending lignified stems and erect or ascending herbaceous flowering branches; decumbent sterile shoots often forming an extension of the stems or arising laterally, more rarely absent; leaves varying greatly in shape, size and venation, petiolate or rarely sessile, entire or sometimes denticulate (a consistent feature of some Far East species), the margin ciliate at least at base; floral leaves similar to the cauline or markedly differentiated (in section *Subbracteatae* Klok.); bracts small, linear-lanceolate; inflorescence capitate or elongate and interrupted. Aromatic plants.

Note. The genus *Thymus* L. contains some hundreds of species, distributed over nearly the whole of Eurasia (except tropics), in N. Africa (as far as Abyssinia), Canary Islands, and reaching Greenland in N.W. direction. We include this genus in the section *Serpyllum* Benth. According to the classification proposed by Briquet (1897) all or nearly all our species would fall into the subsection *Serpylla* Briq. Earlier authorities as well as some more recent ones (Lyka) considered them as subspecies, varieties or forms of a single species, *Th. serpyllum* L. B. It has by now been ascertained that the genus is represented on U.S.S.R. territory by a range of species sufficiently diversified morphologically, strictly associated with definite ecological conditions and covering clearly delimited distribution areas. A critical taxonomic study of this difficult genus was begun in Russia by V. A. Dybyanskii (1910). In the Soviet period, some twenty specialized studies have been contributed by different authors. Among foreign  
471 authors who contributed to the study of thymes of U.S.S.R. one should mention K. Ronniger (1932). Many species have also been subjected to biochemical examination with a view to determining their essential oil content. Differences in chemical composition have been established. It should be pointed out, however, that taxonomic studies of thymes are greatly complicated by fertile hybrids which are often produced in great profusion in areas of contact between different species. These hybrids display

\* Treatment by M.V. Klovov.

\*\* From Greek *thymon* or *thymos*, name applied to some Labiatae by ancient writers.

intermediate and extremely unstable features. Some of them have been described at various times as distinct species (*Th. cimicinus* Blum., *Th. kelleri* M. Pop.). In view of the inconsistency of their characters, we do not include the hybridogenic forms in the present treatment. Outside the areas of contact with other species, the morphological (and biochemical) characteristics of any given species show marked consistency. All or nearly all species have a distinctive general appearance and are readily identifiable under natural conditions. Field observations are of particular importance in the study of this complicated genus. The thymes of the European part of the U.S.S.R. have been repeatedly studied in their natural habitats by a number of botanists (by I. I. Sprygin in the South-East, by S. V. Yuzepchuk in Crimea, etc.), the Caucasian thymes were given much attention by Grossheim and his collaborators, the thymes of Siberia are still the subject of intensive field studies conducted by L. P. Sergievskaya, and certain Siberian and Caucasian species were thoroughly investigated in the field by M. M. Il'in. There have been very few field studies on the interesting thyme flora of the Far East and the mountain regions of Soviet Central Asia; there are correspondingly few coordinated (as opposed to sporadic) herbarium collections from these areas. Our treatment does not by any means provide a complete coverage of the whole range of thyme species of the Soviet Union, even less so because of the fact that, beside the widespread species, there are others which have a very restricted distribution area, and these are infrequently and inadequately represented in herbaria.

Most (but apparently not all) species of the genus are characterized by sexual dimorphism: some plants have hermaphrodite flowers, others have only female flowers with rudimentary stamens and barren anthers. Female individuals always have smaller and paler flowers and they often display other distinctive features.

Paleontological information relating to the genus *Thymus* L. is restricted to a single find in a suburb of Krakow, in Older Quaternary layers. The well preserved leaves have been identified as belonging to *Th. carpaticus* Celak. (*Th. sudeticus* Opiz.). But this find (Zmuda, 1914) provides a convincing proof of the Tertiary origin of present-day thymes.

472 **Economic importance.** Various species of this genus yield essential oil which is of importance in the perfume and spice industries. *Th. serpyllum* L. and related species are used medicinally (*Herba Serpylli*).

*Th. vulgaris* L. (Sp. pl. ed. 1, 1753, 591), originating from the N. W. part of the Mediterranean region, is cultivated. This species belongs to the distinct Mediterranean group *Vulgares* Briq. which is characterized, according to Briquet, by the arachnoid indument of the leaf underside and is regarded by this authority as a subsection of the section *Serpyllum* Benth. This is a subshrub or, when cultivated in more northerly regions, an annual (because of winter freezing). Stems uniformly short-haired; leaves oblong-obovate, 5–10 mm long, 2–3 mm broad, with short but quite distinct petiole; inflorescence usually interrupted; pedicels fairly long; calyx 3–5 mm long; corolla lilac, rather pale to almost white. Growing wild in the Mediterranean region (from Portugal to Greece). Cultivated in Europe and in America for its essential oil; sometimes naturalized. There are variations in oil yield and quality. The value of the oil is determined by the content of phenols (thymol and carvacrol); it is employed in the pharmaceutic and perfumery industries as a source of thymol. In the U.S.S.R., however,

the plant now used for thymol production is *Carum ajowan* Benth. et Hook. which, according to G. V. Pigulevskii (1950) is much more productive.

Some of the native thyme species of the Soviet Union should certainly be considered for cultivation. G. V. Pigulevskii (Rast. syr'e SSSR, I, 1950, 247) particularly recommends *Th. kotschyanus* Boiss.

## Key to Sections

1. Stems distinctly 4-angled, hairy only on two opposite sides (these alternating between successive internodes) or only on the angles (Carpathians, N. W. plains of the European part, mts. of Cisc., S. part of Far East) . . . . . Section 1. **Goniothymus** Klok.
- + Stems terete or obsoletely 4-angled, hairy all round . . . . . 2.
2. Shrubby plants, without trailing sterile shoots; stems ascending, strongly branched; flowering branches and short erect sterile shoots not arising directly from the stems but from their ramifications (E. Transc., Kopet-Dag (2 series) and more northerly regions — from Centr. Transv. to Kazakhstan) (series *Suffruticosi*). Southern species are characterized by pseudomarginal leaf venation (series *Eu-Kotschyani*) and white or whitish corolla. Species of the northern series differ in having short-haired stems and eciliate upper calyx-teeth) . . . . . Section 4. **Kotschyani** Klok.
- 473 + Plants not shrubby, with creeping stems and more or less developed trailing sterile shoots; in the few cases where such sterile shoots are wanting (mainly in the series *Marschalliani*), stems are short and poorly developed; flowering branches arising directly from stems; leaf venation exclusively camptodromous; corolla always colored . . . . . 3.
3. Stems usually terminating in a trailing sterile shoot; lateral trailing sterile shoots not developed; inflorescence capitate; upper calyx-teeth nearly always ciliate; plants of the forest and tundra regions, penetrating into the high-mountain areas of Centr. Asia, but absent in the Caucasus and Crimea . . . . . Section 3. **Euserpyllum** Klok.
- + Stems terminating in a fertile shoot or much less frequently in a sterile shoot (in that case trailing sterile lateral shoots are also produced); more southerly, mainly steppe species and mountain xerophytes . . . . . 4.
4. Leaves linear to broadly elliptical, mostly oblong-elliptical, often long-haired; inflorescence usually elongate, interrupted from base, rarely capitate; stem covered under the inflorescence with long spreading hairs; upper calyx-teeth ciliate; some species penetrate into E. Siberia (Verkhoyansk) and Far East (Uss.) . . . . . Section 2. **Verticillati** Klok.
- + Leaves narrowly linear-acicular to oblong-elliptical, often spatulate, always rather narrow, glabrous or sometimes short-haired; inflorescence capitate; stems covered under the inflorescence with short recurved (rarely long spreading) hairs; upper calyx-teeth ciliate or in many species eciliate . . . . . Section 5. **Subbracteati** Klok.



Section 1. **Goniothymus** Klok. in Bot. Mat. Gerb. Bot. Inst. AN SSSR, XVI (1954). — Stems distinctly 4-angled, alternately hairy on opposite sides or only on the angles; leaves rather broad, ovate or elliptical to suborbicular, always petiolate, with camptodromous or pseudomarginal venation; inflorescence mostly interrupted, rarely capitate, sometimes elongate but not interrupted, spikelike; upper calyx-teeth usually ciliate at margin, rarely naked; corolla bright-colored, lilac or lilac-purple.

474 A mesophytic group, mainly composed of European mountain species but also represented in the Far East.

Note. S. S. Stankov, in his "Opredelitel" (Determination Key), reports a species of this section, *Th. arcticus* Ronn., for the sands of the White Sea coast. This report is dubious since, to the best of our knowledge, this species is endemic to Greenland. We also consider it rather unlikely that it occurs in Norway, as reported in the literature.

1. Middle cauline leaves elliptical or oblong-elliptical, with very short petiole; inflorescence spikelike, elongate, but not interrupted . . . . . 15. **Th. pulchellus** C.A.M.
- + Middle cauline leaves broadly elliptical, oval or ovate, rarely oblong-elliptical, with well developed petiole; inflorescence not spikelike, usually interrupted, more rarely capitate . . . . . 2.
2. Stems hairy only on the angles, glabrous on the faces between them . . . . . 3.
- + Stems hairy on two opposite sides alternating between successive internodes . . . . . 7.
3. Upper calyx-teeth without long multicellular cilia; leaves with indistinct lateral veins (Carpathian Mts.) . . . . . 14. **Th. enervius** Klok.
- + Upper calyx-teeth with long multicellular cilia at margin; leaves with distinct lateral veins beneath . . . . . 4.
4. Calyx 2.5–3.5 mm long in flower, to 4.5 mm in fruit (plains in the forest regions of the European part) . . . . . 5.
- + Calyx 4–5 mm long in flower, to 6 mm in fruit (Greater Caucasus and Carpathian Mountains) . . . . . 6.
5. Calyx 3–3.5 mm in flower, to 4.5 mm in fruit; leaves to 12 mm long and 5 mm broad . . . . . 1. **Th. pulegioides** L.
- + Calyx 2.5–2.75 mm long in flower, to 3.25–3.75 mm in fruit; leaves larger . . . . . 11. **Th. ucrainicus** (Klok. et Shost.) Klok.
- 6 (4). Flowering branches 14–25 cm long; cauline leaves 8–9.5 mm broad (Caucasus) . . . . . 13. **Th. pseudopulegioides** Klok. et Shost.
- + Flowering branches 2.5–10 cm long; cauline leaves to 6.5 mm broad (Carpathians) . . . . . 10. **Th. subalpestris** Klok.
- 7 (2). Venation marginal (the lateral veins become thickened upon reaching the leaf margin and anastomose to form a marginal vein surrounding the blade) (Carpathians) . . . . . 6. **Th. circumcinctus** Klok.

- 475 + Venation camptodromous or pseudomarginal . . . . . 8.
8. Flowering branches arising from stem ramifications of second or third order; leaf venation exclusively camptodromous (Far East) . . . . . 9.
- + Flowering branches arising directly from the stems; leaf venation often pseudomarginal (Carpathians or Caucasus) . . . . . 11.
9. Leaves mostly elliptical, more rarely ovate, with a length/width index 2–3\*; upper calyx-teeth ciliate . . . . . 7. **Th. semiglaber** Klok.
- + Leaves mostly oblong-elliptical or oblong-ovate, with length/width index up to 6; upper calyx-teeth eciliate . . . . . 10.
10. Leaves ovate, to 14 mm long and 4 mm broad, entire, the lower ones on flowering branches with petiole as long as blade; calyx ca. 5 mm long, the upper teeth lanceolate, rather short; sterile shoots ascending . . . . . 9. **Th. komarovii** Serg.
- + Leaves elliptical, to 20 mm long and 7 mm broad, distinctly denticulate, with 2 or 3 denticles at each side, the lower ones on flower branches with petiole not exceeding half length of blade; calyx ca. 6 mm long, the upper teeth narrowly lanceolate, elongate (more than half length of lip) . . . . . 8. **Th. disjunctus** Klok.
- 11 (8). Stems terminating in long trailing sterile shoots . . . . . 12.
- + Stems terminating in fertile shoot, trailing sterile shoots absent . . . . . 13.
12. Leaves 12–16 mm long, 8–11.5 mm broad, the length/width index 1.1–1.6; leaf venation always camptodromous (lateral veins disappearing toward the leaf margin) . . . . . 4. **Th. buschianus** Klok. et Shost.
- + Leaves 8–11 mm long, 5–8.5 mm broad, the length/width index 1.5–2; venation camptodromous or pseudomarginal (in the latter case the upper pair of veins merging mutually and with the middle pair to form a ridge along the leaf margin) . . . . . 3. **Th. caucasicus** Willd.
- 13 (11). Leaves mostly elliptical, the length/width index 1.7–4.8 (Carpathians) . . . . . 5. **Th. alternans** Klok.
- + Leaves ovate or ovate-triangular, the length/width index not exceeding 1.5 (Caucasus) . . . . . 14.
- 476 14. Venation camptodromous; fertile shoots covered with long spreading hairs . . . . . 1. **Th. nummularius** M.B.
- + Venation pseudomarginal; fertile shoots covered with shorter hairs (less than stem diameter) . . . . . 2. **Th. pseudonummularius** Klok et. Schost.

These figures signify that the length to width ratio ranges from 1:2 to 1:3. The ratios are thus designated in the sequel.

Subsection 1. *Alternantes* Klok. — Stems alternately hairy on two opposite sides, the other two sides glabrous; leaf venation camptodromous or pseudomarginal, rarely marginal.

Series 1. *Nummularii* Klok. — Stem terminating in a fertile shoot; sterile shoots lateral, arising from stems together with flowering branches, ascending; venation mostly pseudomarginal; leaves broad-ovate; inflorescence oblong-capitate or interrupted; calyx relatively large; corolla lilac-purple; Caucasian high-mountain species.

1. *Th. nummularius* M. B. Fl. taur.-cauc. II (1808) 5; Ronniger in Grossg. Fl. Kavk. III, 344.

Subshrub; stems short, terminating in a fertile shoot; flowering branches 10–30 cm long, 4-angled, covered on two opposite sides with spreading hairs 1–1.5 mm long; leaves petiolate, broad-ovate or ovate-triangular, truncate or somewhat rounded at base, 10–19 mm long, 7–11 mm broad, rather thin, ciliate at margin at least up to the middle, sparsely-haired on the veins beneath, glabrous above, with 2–3 pairs of lateral veins disappearing toward the margin and nowhere merging (venation typically camptodromous), punctate-glandular, more distinctly and profusely so on the lower side; inflorescence elongate-capitate or interrupted, with several distant whorls; pedicels as long as calyx; calyx 4–5 mm long, hairy below, glabrous above, the upper teeth narrowly lanceolate, ciliate; corolla ca. 7 mm long, lilac-purple, copiously hairy outside. June–July. (Plate XXVII, Figure 2.)

Alpine meadows. — Caucasus: Main Caucasus range. Endemic. Described from the Caucasus. Type in Leningrad.

2. *Th. pseudonummularius* Klok. et Shost. in Tr. Bot. inst. AzFAN, II (1936) 306.

Subshrub; stems short, ascending, terminating in a fertile shoot; flowering branches more or less curved, 10–20 cm long, alternately hairy on two sides, the hairs shorter  
477 than stem diameter, recurved or appressed, intermixed with few longer spreading hairs; leaves short-petioled, ovate or ovate-triangular, short-cuneate at base, subobtusely or rounded at apex, 7–15 (20) mm long, 5–12 mm broad, the length/width ratio 1.3–1.5; venation exclusively pseudomarginal; lateral veins 3–5 pairs, slender but prominent, the lowest pair running along or near the leaf margin, the lower pairs often merging with those above them, the upper pair reaching the leaf margin and confluent with the midrib; leaf margin ciliate only in the lower one-third; leaf surface glabrous, rarely with scattered hairs (f. *hirsutus* Klok. et Shost.); glands few, rather indistinct; inflorescence an elongated head, usually with one distant whorl, to 5 cm long, at least the lower dichasia distinctly peduncled; pedicels slightly shorter than calyx at anthesis, longer in fruit, short-haired; calyx 4.25–5 mm long (in flower), long-haired below, glabrous above, with dark lilac nerves; upper teeth narrowly lanceolate,



acute, divergent, long-ciliate; corolla of hermaphrodite flowers bright lilac; nutlets rounded-trigonus. June–July.

Alpine and subalpine meadows. — Caucasus: Cisc. (W. part of Main Caucasus range). Endemic. Described from Maikop region. Type in Kiev.

Series 2. *Caucasici* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954). — Stems terminating in a sterile shoot; sterile shoots terminal and lateral or arising from rootstock, more or less elongated, prostrate or trailing; venation usually camptodromous; leaves broad-ovate or suborbicular to elliptical; inflorescence capitate or interrupted; calyx large or medium-sized; corolla bright lilac.

This series contains Caucasian and Central European (E. Carpathian) mountain species.

3. *Th. caucasicus* Willd. in Linnaea (1837) 341 (nomen) ex Ronn. in Fedde, Report. XXXI (1932) 158; Ronniger in Grossg. Fl. Kavk. III, 344.

Subshrub; stems long, rooting, terminating in a sterile shoot; flowering branches 7–10 cm long, covered alternately on two sides with short hairs; leaves petiolate, rather thin, ovate or ovate-triangular, 8–11 mm long, 5–8.5 mm broad, with length/width index 1.5–2, ciliate up to the middle, glabrous or with scattered short hairs above; lateral veins 2 or 3 pairs; venation camptodromous or pseudomarginal; glands 478 small, numerous on the lower cauline leaves; inflorescence capitate, rarely oblong-capitate; pedicels shorter than calyx; calyx narrowly campanulate, 4–5 mm long, lilac, hairy below, glabrous above, the upper teeth lanceolate, acute, ciliate; corolla lilac-purple, 7.5–8.5 mm long. June–July.

Alpine meadows. — Caucasus: Main Caucasus range. Endemic. Described from the Caucasus. Type not preserved.

Note. Ronniger described two varieties of this species, var. *terekensis* Ronn. and var. *medwedewii* Ronn. (in Fedde, Report. XXX, 1932, 15). The latter is distinguished from the typical form of the species by the dense indument of the stem, consisting of longer hairs (to 1 mm), but it appears to be of hybrid derivation. The species may, however, prove to be of a somewhat composite nature which is suggested, among others, by the mixed type of venation.

4. *Th. buschianus* Klok. et Shost. in Tr. Bot. inst. AzFAN SSSR, II (1936) 305.

Subshrub; stems long, slender, terminating in a decumbent sterile shoot; there are also lateral prostrate sterile shoots arising from the stems; flowering branches ascending, to 18 cm long, distinctly quadrangular, alternately covered on two opposite sides with short appressed and more profuse long hairs; leaves oblong-ovate to suborbicular, petiolate, on fertile shoots rounded-ovate to suborbicular, rounded or short-cuneate at base, (9) 12–16 (18) mm long, (6) 8–11.5 mm broad, with length/width



PLATE XXVII. 1 – *Thymus pulchellus* C. A. M., plant fragment, part of stem, leaf, calyx; 2 – *Th. nummularius* M. B., plant fragment, part of stem, leaf, calyx; 3 – *Th. circumcinctus* Klok., plant fragment, calyx, leaf.

ratio 1.1–1.6, on sterile shoots to 20 mm long, with cuneate base and length/width index 1.8–2.5; all leaves ciliate all round, sparsely covered on both sides (more densely beneath) with long hairs; venation always camptodromous, the lateral veins prominent; glands few and rather indistinct; inflorescence more or less elongated, with 1 or 2 distant whorls; pedicels shorter than calyx at anthesis, covered with very short hairs; calyx narrowly campanulate, (3.5) 4–5 mm long in flower, to 6 mm in fruit, more or  
481 less lilac-colored, hairy below, subglabrous above, the upper teeth lanceolate or narrowly lanceolate, elongate, long-ciliate; corolla 6–8 mm long, bright lilac; nutlets subglobose, ca. 0.8 mm in diameter. June.

Rocks and meadows in the alpine belt. — Caucasus: Main Caucasus range. Endemic. Described from Dagestan (Kodori Pass). Type in Leningrad.

Note. Hybrids of this species with *Th. caucasicus* Willd. have been recorded.

5. *Th. alternans* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems short, ascending or more elongated, creeping, terminating in a fertile shoot; flowering branches ascending or assurgent, 6–25 cm long, distinctly 4-angled, hairy alternately on two opposite sides, the hairs in and under the inflorescence ca. 1 mm long, retrorse or horizontally spreading, those near the base of branches short, recurved; leaves petiolate, elliptical, oblong-elliptical or oval, on sterile shoots and axillary branches narrower, all cuneate at base, 4–18 mm long (including petiole), 1.5–9 mm broad, the petiole to 3 mm long, the length/width index 1.7–4.8, the sparse cilia to  $\frac{1}{4}$ – $\frac{2}{5}$  of leaf length; blade subglabrous; glands small, rather indistinct; lateral veins 2–4 pairs; inflorescence an elongated head, to 16 cm long, with 1–7 whorls below it, often branched, only on weaker branches without supplementary whorls; pedicels to 3–4 mm long, often nearly equaling the calyx; calyx campanulate, 3–4 mm long, hairy all round, not distinctly lilac, with dark green nerves on the tube and whitish internerves; corolla 5–6 mm long, raspberry-colored; nutlets short-ellipsoid, 0.6–0.8 mm long. June–August.

Meadows, slopes in lower mountain zone and in foothills of the Carpathians. — European part: U. Dns. (Carpathians). **Gen. distr.:** Carpathians. Described from Transcarpathian Province. Type in Kiev.

Note. Apparently endemic to E. Carpathians.

6. *Th. circumcinctus* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954). — *Th. sudeticus* auct. fl. pol. non Opiz.

Subshrub; stems long, slender, usually rooting, terminating in a trailing sterile shoot; flowering branches 1.5–7 cm long, slender, ca. 0.5 mm in diameter, weak, curved, covered alternately on opposite sides with more or less recurved hairs, these  
482 under the inflorescence equaling or slightly exceeding branch diameter; leaves coriaceous, mostly long-petioled, ovate to suborbicular, sometimes ovate-triangular, 3–12 (13) mm long, 1.5–6 mm broad; cauline leaves somewhat smaller than those on sterile shoots, to 10 (11) mm long and 5 mm broad, all petiolate, the petiole to 3 mm long, in the lower middle leaves of fertile and sterile shoots often nearly equaling the blade; lateral veins 3–4 pairs, the lower pair nearly reaching the leaf margin, the



others thickening toward the margin, merging to form a marginal vein framing the whole blade (marginal venation), the margin ciliate to the middle or in upper leaves to two-thirds, the cilia 0.5–1.5 mm long; upper leaves with scattered long hairs, others glabrous, with glands scattered, small, scarcely distinct, on the lower side only; inflorescence capitate, 10–17 mm in diameter (in flower); pedicels to 2 mm long at anthesis; calyx campanulate, 3.5–4 mm long, usually ca. 4 mm, rather intensely suffused with lilac or dark purple, with dense hairs below, subglabrous or sparse hairs above, the upper teeth lanceolate, ciliate; corolla 6–7 mm long, lilac-purple (raspberry-colored). June–July. (Plate XXVII, Figure 3.)

Meadows and exposed slopes in the subalpine belt of the Carpathians. — European part: U. Dns. (Carpathians). **Gen. distr.:** E. Carpathians. Apparently an E. Carpathian endemic. Described from Rakhov distr. of the Transcarpathian Province, USSR. Type in Kiev; cotype in Leningrad.

**Note.** This species has been classified up till now as *Th. sudeticus* (Opiz) Borb. (*Th. carpaticus* Celak.), but the latter is readily distinguishable from our species by the indument which is continuous, even though often sparse, on the face of the quadrangular stem; calyx is longer, ca. 4.5 mm, but narrower, with more elongated, narrowly lanceolate upper calyx-teeth; leaves with more cuneate base and less distinct petiole. It is doubtful whether *Th. sudeticus* (Opiz) Borb. should at all be included in the same section with our species.

**Series 3. *Disjuncti* Klok.** — Stems branching, the flowering branches arising from ramifications of second and third order; leaves elliptical or oblong-elliptical, with length/width index above 2; venation camptodromous; inflorescence capitate, often with a distant depauperate whorl; calyx large, the upper teeth ciliate or eciliate; corolla rose-lilac; lowland plants of the Far East and E. Siberia.

7. *Th. semiglaber* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

- 483 Subshrub with rather stout branching stems; flowering branches arising from rather slender, second-order stem ramifications terminating in a fertile shoot, 3–7 cm long, quadrangular, covered alternately on two sides with short recurved hairs (subglabrous on the two other sides), lilac-colored; prostrate or trailing sterile shoots wanting; leaves elliptical or rarely ovate, distinctly short-petioled, entire, ciliate to  $\frac{1}{4}$ – $\frac{1}{2}$  of leaf length, glabrous; lateral veins 2–3 pairs, slender but rather prominent; glands small, scattered; leaves at base of branches persistent till flowering time, 2.5–5 mm long, 1.5–2 mm broad; cauline leaves 3 or 4 pairs at flowering, 5–13 mm long, 2–5.5 mm broad, with length/width index 2–3, the lowermost smallest but with longer petiole however not exceeding half length of blade; inflorescence loosely capitate; pedicels to 3 mm long, covered with short recurved hairs; calyx tubular-campanulate, 4–5 mm long, lilac or dark lilac, with patent hairs, glabrous only under the teeth; upper teeth narrowly lanceolate, fine-pointed, less than half length of upper lip, ciliate; corolla nearly twice as long as calyx, rose-lilac. July–August.

Rocks. — Far East: Uss. Endemic. Described from the shores of Nakhtakhe Bay and so far not found elsewhere. Type in Leningrad.

8. *Th. disjunctus* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems slender, arched, branching, the ramifications terminating in a fertile or rarely sterile shoot; there are also trailing or ascending sterile shoots arising from the stems or directly from the rootstock together with the stems; flowering branches 2.5–8 cm long, quadrangular, hairy alternately on opposite sides, subglabrous on the other two sides, dark lilac, the hairs under the inflorescence shorter than stem diameter, recurved, at the base of branches shorter; leaves mostly oblong-elliptical, short-petioled, distinctly denticulate, with 2 sharp denticulations at each side, the margin ciliate in lower one-third; lateral veins 2 or 3 pairs, rather prominent, not confluent; glands distinct; basal leaves small, 2–4 mm long, mostly not persistent till flowering time; cauline leaves 6–20 mm long, 1.5–7 mm broad, with length/width index 2.8–6, the lowermost smallest but relatively broad, elliptical to broadly elliptical, with petiole approximately half length of blade; upper leaves with a very short but distinct petiole, less obtuse than the others, ranging to subacute; inflorescence capitate, often with a depauperate distant whorl; pedicels to 3.5 mm long, covered with short recurved hairs; calyx tubular-campanulate, 5–6 mm long, lilac or dark lilac, sparsely haired beneath, glabrous above; upper calyx-teeth elongated (longer than half length of upper lip), narrowly lanceolate, the margin with short setae but without long cilia; corolla nearly twice as long as calyx, rose-lilac; nutlets short-ellipsoid, 0.7–0.8 mm long, 0.5–0.7 mm broad. July–August.

Stony steppes, sand dunes. — Far East: Uss. **Gen. distr.:** probably occurring in northern parts of China (Manchuria). Described from Vladivostok distr. (village Pokrovka). Type in Leningrad.

9. *Th. komarovii* Serg. in Animadv. syst. ex Herb. Univ. Tomsk. No. 1 (1938) 3.

Subshrub; stems rather slender, curved, terminating in a fertile shoot; sterile shoots arising from primary (poorly developed) branching stems, ascending; flowering branches 4–9 cm long, 4-angled, covered only alternately on two opposite sides with short (slightly longer under the inflorescence) recurved hairs, dark lilac, sparsely leafy; cauline leaves 3 or 5 pairs, petiolate, ovate or oblong-ovate, 7–14 mm long, 2–4 mm broad, with length/width index 2.25–5.6, the lowermost shorter but relatively broader, with petiole length of blade, the uppermost with a short but distinct petiole, obtuse; leaves on sterile shoots similar; cilia at leaf margin reaching base of blade, few, the leaf surface glabrous; lateral veins 2–3 pairs, stoutish, slightly prominent; glands small, rather indistinct; inflorescence oblong-capitate, to 2.5 cm long, rather loose; pedicels 1.5–3 mm long, covered with short recurved hairs; calyx narrowly campanulate, 4.5–5.5 mm long, hairy below, glabrous above, dark lilac, the upper teeth lanceolate, often curved, eciliate; corolla dark rose-lilac, 6–8 mm long. July–August.

Calcareous rock outcrops. — Far East: Uss. **Gen. distr.:** possibly occurring in the northern parts of Manchuria. Described from Suchan district (Chandalaz volcano). Type in Tomsk; cotype in Leningrad.

Subsection 2. *Goniotrichi* Borb. Symb. ad Thymos (1890), progr.; Klok. and  
485 Shost. in Uch. zap. Khar'k. Gos. univ. 14, 117 pro grege. — Stems hairy on the angles,  
all the faces glabrous; leaf venation camptodromous.

Series 1. *Pulegioides* Klok. et Shost. in Uch. zap. Khar'k. Gos. univ. 6–7 (1936)  
290 and 14 (1938) 118. — Inflorescence capitate or elongate, interrupted; calyx small  
or fairly large, the upper teeth ciliate.

This series contains mainly Central European mountain and lowland species.

10. *Th. subalpestris* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954). —  
*Th. alpestris* auct. fl. pol. non Tausch.

Subshrub; stems slender, creeping, terminating in a sterile or fertile shoot; flowering  
branches assurgent or ascending, 2.5–10 cm long, rather slender, weak, more or less  
curved, simple or sometimes slightly branched in upper half, 4-angled, covered only on  
the angles with short recurved hairs; sterile shoots resembling the fertile; leaves ellip-  
tical to suborbicular, ovate-elliptical or sometimes a few lower leaves rounded-rhomboid,  
all distinctly petiolate, 3.5–4.5 mm long including petiole, 1.5–6.5 mm broad; basal  
leaves small, rather thin to relatively firm, 2.5–2.75 mm long, 1.25 mm broad, short-  
petioled; cauline leaves 3–5 pairs, much shorter than internodes, these to 2.5 cm long;  
petiole of more developed leaves 1–2.5 mm long; length/width index 1.1–5.2; lateral  
veins 3–4 pairs, the uppermost often merging toward apex; cilia reaching only the  
base of blade; glands few, small, rather indistinct; inflorescence capitate, sometimes  
with a depauperate distant whorl; calyx narrowly campanulate, (3.5) 4–4.75 mm  
long, dark purple, sparsely-haired below, glabrous above; upper teeth lanceolate, acu-  
minate, the margin with few or very few cilia and setae (sometimes eciliate in a form  
with short denticles); corolla dark lilac or lilac-purple. June–August.

Mountain meadows in the Carpathians. — European part: U. Dns. (Carpathians).

**Gen. distr.:** W. Carpathians. Described from Transcarpathian Province of Ukrainian  
SSR. Type in Kiev.

Note. This species differs from the closely related, more westerly *Th. alpestris*  
Tausch (growing in Sudeten) in a number of characters: leaves differing in shape,  
long-haired beneath (not glabrous or with few short hairs); upper calyx-teeth at least  
partly ciliate (not glabrous or slightly scabrous). Trailing sterile shoots much less  
486 developed. *Th. subalpestris*, previously regarded as a transitional form between  
*Th. alpestris* Tausch and *Th. pulegioides* L., is massively distributed in the high  
mountain zone of E. Carpathians, it displays a set of morphological characteristics,  
and it has a defined distribution area where it fully replaces *Th. alpestris* Tausch;  
it thus undoubtedly constitutes a distinct geographic race.

11. *Th. ucrainicus* (Klok. et Shost.) Klok. comb. n. — *Th. pulegioides* ssp. *ucra-*  
*inicus* Klok. et Shost. in Visn. Kii'vsk. bot. sadu, XVI (1932) 6 and in Uch. zap.  
Khar'k. Gos. univ. 14 (1938) 118. — *Th. glaber* Dub. in Fedch. and Fler. Fl. Evrop.  
Ross. (1910) 832; Syreishch. Fl. Mosk. gub. III, 79; Klok. and Shost. in Tr. s.-g.



Bot. I, 3 (1927) 113, non Mill. — *Th. serpyllum* var. *chamaedrys* Schmalh. Fl. II (1897) 311, non *Th. chamaedrys* Fr.

Perennial; stems short, rather stout, terminating in a fertile shoot; sterile shoots exclusively lateral, not prostrate; flowering branches assurgent or erect, 10–30 (36) cm long, markedly 4-angled, short-haired only on the angles (sometimes only on two of them); leaves shorter than internodes, mostly without axillary fascicles, all with petiole 1–2.5 mm long, ovate or broadly elliptical, cuneate at base, 7–20 mm long (including petiole), 2.5–13 mm broad, rather thin, sometimes distinctly denticulate, ciliate to base of blade, rarely to  $\frac{1}{3}$  length of leaf, the surface glabrous; venation typically camptodromous; glands rather indistinct; inflorescence oblong-capitate or interrupted, with up to 6–9 distant whorls, to 10–18 cm long, often branched; calyx broadly campanulate, 2.5–2.75 mm long in flower, up to 3.25–3.75 mm in fruit, lilac; upper teeth sharply triangular, subequal, ciliate; corolla 4–6 mm long, with elongated tube, subglabrous outside, lilac; nutlets ellipsoid, 0.6–0.8 mm long, ca. 0.5 mm broad. July–August.

Wood margins and openings in deciduous forests, dry valley meadows and grassy slopes, mineral mounds in bogs. — European part: Lad.-Ilm., Balt., U. Dnp., U. Dns., U. V., M. Dnp. (N. border), V.-Don (N. W.). **Gen. distr.:** Centr. Eur. (E. parts of Poland). Described from the vicinity of Fastov in the Kiev Province. Type in Kiev.

Note. This species represents the most easterly geographic race of the complex W. European cycle of forms covered by the appellation *Thymus pulegioides* L. sensu amplo, certainly not identical with the typical *Th. pulegioides* L. s. str.; it gives rise to numerous hybrids with other species, mainly at the southern limit of its  
487 distribution area, most frequently with *Th. serpyllum* L. s. str. (*Th. polessicus* Klok. sp. hybr.); also with *Th. marschallianus* Willd., *Th. lövianus* Opiz., *Th. czerniajevii* Klok. et Shost. A cross with *Th. pulegioides* L. (sensu str.) apparently occurs at the western limit of the distribution area.

12. *Th. pulegioides* L. Sp. pl. (1753) 592; Ronn. in Repert. of the Bot. Exchange Club (1923) 226–239. — *Th. pulegioides* ssp. *pulegioides* Ronn. in Fedde, Repert, XXX, 2 (1930) 369. — *Th. ovatus* Mill. Gard. Dict. ed. VII (1759) No. 7.

Perennial, less widespread in the U.S.S.R. than *Th. ucrainicus* Klok. and differing from it in a number of features: lower growth; leaves smaller, to 10–12 mm long and 5 mm broad; inflorescence mostly capitate; calyx 3–3.5 mm long in flower, to 4.5 mm in fruit; corolla somewhat larger and more intensely colored. June–August.

Forest opening and grassy slopes. — European part: Balt., U. Dns. (Transcarpathia). **Gen. distr.:** Scand., Atl. and Centr. Eur. (to the Carpathians). Described from France (Montpellier). Type in London.

Note. An aggregate species. Forms occurring in the most westerly districts of the European part of U.S.S.R. still need further study. In the extreme North-West one may expect the occurrence of the kindred species *Th. glaber* Mill. (l. c. No. 6) which is distinguished by the presence of trailing lateral shoots, short and slender stems, and small leaves (6–8 mm long, 3–4 mm broad).

13. *Th. pseudopulegioides* Klok. et Shost. in Tr. Bot. inst. AzFAN SSSR, II (1936) 305.

Subshrub; stems slightly woody, terminating in a fertile shoot; sterile shoots erect or assurgent, lateral; flowering branches 14–25 cm long, usually branched at summit, distinctly quadrangular, covered only on the angles with short retrorsely appressed hairs, only the first internode under the inflorescence with longer semiappressed or subpatent hairs partly extending to the faces; leaves petiolate, broad-ovate, rounded or short-cuneate at base, (10.5) 12–16 mm long, (5) 6–9.5 mm broad, with length/width index 1.3–1.6, occasionally up to 2.1, sparsely ciliate to base of blade, with scattered long hairs on the veins beneath; venation exclusively camptodromous, the lateral veins prominent; glands rather indistinct; inflorescence an elongate head, toward the end of the flowering period with 1 or 2 distant whorls; pedicels slightly shorter  
488 than calyx, covered with short retrorse hairs; calyx narrowly campanulate, 4.5–5.25 mm long in flower, to 6 mm in fruit, lilac or at least with lilac nerves, sparsely-haired below, glabrous or with isolated hairs above; upper calyx-teeth long-ciliate; corolla 6–7 mm long, copiously hairy outside, lilac; nutlets ellipsoid, ca. 1 mm long and 0.75 mm broad. June–July.

Meadows in the alpine and subalpine zones (at altitudes from 1250 to 2650 m). – Caucasus: Cisc. (W. part of Main Caucasus range). Endemic. Described from Mt. Bermamut. Type in Leningrad.

Note. There are records of crosses with *Th. nummularius* M. B., the sole representative of the series *Pulegioides* Klok. et Shost. in the Caucasus.

Series 2. *Montani* Klok. – Inflorescence elongate, interrupted; calyx larger, the upper teeth eciliate. This series consists exclusively of Centr. European mountain species.

14. *Th. enervius* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems rather short, creeping, rooting, terminating in a fertile shoot (inflorescence); sterile shoots arising from stems or from rootstock, in the latter case prostrate, ascending at the tip, branched; flowering branches assurgent or ascending from base, 10–20 cm long, hairy only on the angles, the hairs recurved, more profuse and longer toward summit; sterile shoots also hairy only on the angles, the hairs shorter; leaves petiolate, elliptical, 8–17 mm long, 2.5–6 mm broad, cuneate at base, gradually narrowed to petiole 2–4 mm long, obtuse or subobtuse at apex, sparsely long-ciliate in lower third, rather indistinctly punctate-glandular beneath; inflorescence usually branched in lower part, with 2 opposite branches terminating in flower-head, interrupted above, with 1–3 more or less distant whorls; pedicels to 3 mm long, densely covered with short recurved hairs; calyx tubular-campanulate, 3.5–4 mm long, with scattered long hairs below, glabrous above; upper teeth narrowly lanceolate, longer than the undivided part of upper lip, subaristate, the margin eciliate, with short unicellular setae; corolla slightly longer than calyx, whitish. June–August.

Mountain slopes in the Carpathians. — European part: U. Dns. (Carpathians). **Gen. distr.:** E. Carpathians. Described from the Transcarpathian Province of the Ukrainian SSR (Mt. Goverla). Type in Kiev.

Note. This species is so far known only from Mt. Goverla in the Rakhov distr. of the Transcarpathian Province, where it was first collected by D. N. Dobrochaeva in 489 1947. It is most closely related to *Th. montanus* W. et K. in which the upper calyx-teeth are also devoid of long multicellular cilia. To judge by the specimens published in "Flora exsiccata Austro-Hungarica," No. 2412, *Th. montanus* W. et K. has larger leaves, 12–22 mm long, 5–8 mm broad, partly oblong-ovate, with slender prominent veins beneath and numerous distinct punctate glands; stems with markedly shorter hairs; calyx smaller, 2.75–3.5 mm long in flower, with sparse short hairs in lower part, the upper teeth less pointed; corolla lilac. The specimens cited were collected in Transylvania at an altitude of 180–190 m. *Th. montanus* W. et K. does not apparently enter into the composition of high-mountain flora. Our species was collected in a low subalpine glade in the upper spruce forest zone.

Series 3. *Pulchelli* Klok. et Shost. in Uch. zap. Khar'k. Gos. univ. 6–7 (1936) 291. — Inflorescence elongated but not interrupted, spikelike.

This series consists of a single Ciscaucasian species which differs in habit from all other Soviet species.

15. *Th. pulchellus* C. A. M. Verzeichn. (1831) 7. — *Th. pulegioides* ssp. *pulchellus* Ronn. in Fedde, Repert. XXXI (1932) 15; Grossg. Fl. Kavk. (1932) 345.

Subshrub; stems short, terminating in fertile shoot; flowering branches 15–20 cm long, hairy on all four angles, glabrous between them, densely leafy, with axillary fascicles; leaves elliptical or oblong-elliptical, with very short petiole, 8–12 mm long, 2–5 mm broad, glabrous, without distinct cilia; inflorescence dense, spikelike, with conspicuous floral leaves; calyx tubular-campanulate, ca. 4.5 mm long, scabrous; upper teeth narrowly lanceolate, fine-pointed, densely ciliate; corolla ca. 7 mm long, lilac. June–July. (Plate XXVII, Figure 1.)

Gypsiferous slopes. — Caucasus: Cisc. Endemic. Described from Kuban. Type in Leningrad.

Note. A little known but quite distinctive plant, very inadequately represented in herbaria and needing additional collections.

Section 2. *Verticillati* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954). — Grex *Verticillati* Klok. et Shost. in Uch. zap. Khar'k. Gos. univ. 6–7 (1936) 293. — Stems terminating in a fertile shoot; flowering branches and herbaceous sterile shoots 490 terete, hairy all round; indument of stem under inflorescence usually consisting of long spreading hairs; leaves always with camptodromous venation, mostly broad-petioled, more rarely sessile, linear to broadly elliptical, relatively large; inflorescence



interrupted at least toward the end of the flowering period, rarely capitate; upper calyx-teeth always more or less copiously ciliate; steppe or mountain-steppe plants.

Species of this section are distributed in the temperate zone of Eurasia, from N. Europe to Himalayas, N. India and N. China.

1. Decumbent sterile shoots wanting; leaves sessile (rarely the lower cauline short-petioled); calyx small, 2.25–3.5 mm long in flower . . . . . 2.
- + Decumbent sterile shoots more or less developed; all leaves or at least the lower distinctly petiolate; calyx usually large . . . . . 8.
2. Leaves with dense hairs on both sides . . . . . 3.
- + Leaves glabrous (specimens with scattered hairs occur occasionally) . . . . . 4.
3. Middle cauline leaves 2–4 (5) mm broad . . . . . 36. *Th. pannonicus* All.
- + Middle cauline leaves 0.7–1.5 mm broad . . . . . 42. *Th. lavrenkoanus* Klok.
- 4 (2). Calyx very small, 2.25–2.75 mm long in flower, to 3.5 mm in fruit. . . . . 5.
- + Calyx larger, (2.75) 3–3.5 mm long in flower and up to 4–5 mm in fruit . . . . . 6.
5. Leaves oblong-elliptical, (12.5) 15–24 (30) mm long, 2.5–5 (7.5) mm broad . . . . . 40. *Th. marschallianus* Willd.
- + Leaves linear, (7) 8–15 (16) mm long, 1.25–1.75 mm broad . . . . . 41. *Th. stepposus* Klok. et Shost.
- 6 (4). Flowering branches (3) 4–15 cm long; cauline leaves 1.5–2.5 (3.5) mm broad; inflorescence unbranched . . . . . 39. *Th. dzevanovskyi* Klok. et Shost.
- + Flowering branches 12–30 cm long; cauline leaves 1.5–7.5 (9) mm broad; inflorescence mostly branched . . . . . 7.
7. West Ukrainian plant, not lemon-scented . . . . . 37. *Th. latifolius* (Bess.) Andr.
- + North Caucasian plant with a strong lemon scent . . . . . 38. *Th. pastoralis* Iljin.
- 8 (1). Lower cauline leaves differing markedly from the upper, with petiole nearly equaling the broadly elliptical or orbicular blade or slightly shorter\* . . . . . 9.
- 491 + Lower cauline leaves little different in shape from the upper, short-petioled . . . . . 12.
- 9 Flowering branches covered to base with long spreading hairs (steppe woods) . . . . . 32. *Th. czernjaevii* Klok. et Shost.
- + Flowering branches covered in lower half with short recurved hairs (other habitats) . . . . . 10.
10. Leaves small, 4–9 mm long, hairy above (E. Siberia) . . . . . 34. *Th. glacialis* Klok.
- + Leaves much larger, glabrous (other regions) . . . . . 11.
11. Dichasia distinctly peduncled; corolla very pale (Transcaucasia). . . . . 35. *Th. karamarianicus* Klok. et Shost.
- + Dichasia without distinct peduncle; corolla intensely rose-lilac (W. districts of Ukrainian SSR) . . . . . 33. *Th. loevyanus* Opiz.
- 12 (18). Leaves hairy on both sides . . . . . 13.

\* cf. *Th. litoralis* Klok. et Shost.

- + Leaves glabrous . . . . . 20.
13. Leaves linear-spatulate; inflorescence usually elongating toward end of  
flowering period but not interrupted; pedicels very short . . . . . 16. *Th. hirsutus* M. B.
- + Leaves oblong-elliptical; inflorescence usually at length interrupted; pedicels  
longer . . . . . 14.
14. Upper leaves of flowering branches sessile . . . . . 15.
- + All leaves distinctly petiolate . . . . . 18.
15. Leaves often denticulate; calyx 3.5–7 mm long (Far East, E. Siberia) . . . . . 16.
- + Leaves entire; calyx 4–5.5 mm long (European part) . . . . . 17.
16. Calyx 4.5–7 mm long (Far East) . . . . . 30. *Th. przewalskii* Kom.
- + Calyx 3.5–4.5 mm long (E. Siberia) . . . . . 29. *Th. turczaninovii* Serg.
17. Leaves 1–2.75 mm broad; calyx 4–5.5 mm long (Crimea) . . . . . 18. *Th. zelenetzkyi* Klok. et Shost.
- + Leaves 1.75–5.5 mm broad; calyx 3–3.5 (4) mm long in flower, 4–4.5  
(5) mm in fruit (Podolia) . . . . . 19. *Th. amictus* Klok.
- 18 (14). Flowering branches 3–5.5 cm long; calyx 3–3.5 mm long in flower . . . . . 24. *Th. elisabethae* Klok. et Shost.
- + Flowering branches 10–20 cm long; calyx larger . . . . . 19.
19. Leaves 3–5 mm broad; flowering calyx ca. 4 mm long (Caucasus) . . . . . 21. *Th. markhotensis* Malejev.
- + Leaves 1.75–3 mm broad; flowering calyx 3.5–3.75 mm long (Crimea) . . . . . 25. *Th. litoralis* Klok. et Shost.
- 20 (12). Leaves oblong-spatulate or linear, 1–1.5 (2) mm broad (Crimea) . . . . . 17. *Th. callieri* Borb.
- 492 + Leaves oblong-elliptical or oblong, not less than 2 mm broad (other regions) . . . . . 21.
21. Leaves mostly sessile; flowering calyx small, 2.5–3.5 mm long . . . . . 20. *Th. podolicus* Klok. et Shost.
- + All leaves, rarely only the lowest, distinctly petiolate; calyx larger . . . . . 22.
22. Flowering branches covered under the inflorescence with short recurved  
hairs . . . . . 23.
- + Flowering branches covered under the inflorescence with long spreading  
hairs . . . . . 25.
23. Cauline leaves linear-oblong, 2 mm broad, with 2 pairs of lateral veins;  
flowering calyx 5 mm long . . . . . 28. *Th. klokovii* (Ronn.) Shost.
- + Leaves oblong-elliptical, 2–4 mm broad; flowering calyx 3–4 mm long . . . . . 24.
24. Flowering branches 10–20 cm long; inflorescence usually interrupted . . . . . 22. *Th. bulgaricus* (Dom. et Podp.) Ronn.
- + Flowering branches 3–7 cm long; inflorescence usually capitate . . . . . 31. *Th. coriifolius* Ronn.
- 25 (23). Leaves 1.5–2.5 (3) mm broad, all except the lower cauline sessile (Crimea) . . . . . 26. *Th. jailae* (Klok. et Shost.) Stank.

- + Leaves 1.5–4 (5) mm broad, all petiolate (other regions) . . . . . 26.
- 26. Most leaves 13–14 mm long, 3–4 mm broad, the length/width index not exceeding 4.7, the veins prominent beneath . . . . . 23. *Th. tiflisiensis* Klok. et Shost.
- + Most leaves 13–18 mm long, the length/width index 4.2–10.6, the veins less prominent . . . . . 27. *Th. dimorphus* Klok. et Shost.

Series 1. *Callieriani* Klok. et Shost. in Uch. zap. Khar'k. Gos. univ. 5–7 (1936) 293 and 14 (1938) 119. — Sterile shoots arising from stems or from rootstock together with stems, prostrate or trailing; cauline leaves not much differentiated, all or at least the lower with a short but distinct petiole; calyx moderately large to large, rarely small.

Petrophilous species, distributed (discontinuously) from the Balkan Peninsula to the Far East.

The series is here adopted in a wide scope. It should undoubtedly be broken up into a number of more restricted series, but this is not practicable at the present stage.

16. *Th. hirsutus* M. B. Fl. taur.-cauc. II (1808) 59, non III (1819) 406, emend.; Klok. and Shost. in Tr. Bot. inst. AN SSSR, I, 2, 279 and in Uch. zap. Khar'k. Gos. univ. 14, 122. — *Th. roegneri* C. Koch in Linnaea, XXI (1848) 666. — *Th. euxinus* H. Braun apud Zelenetskii, Mat. dlya fl. Kryma (1906) 342, non Ronn. (1930).

Subshrub; stems rather slender or moderately stout, terminating in fertile shoot; sterile shoots arising from stems, decumbent or ascending; plant whitish with a dense coat of long and short hairs; flowering branches assurgent, 3–14 cm long, covered nearly to base with long spreading hairs; lowermost leaves short-petioled, others sessile, linear-apatulate, 8–12 (15) mm long, (0.75) 1–2 (25) mm broad, subobtusely ciliate up to apex, densely covered on both sides with long and short hairs; midrib prominent, lateral veins and glands rather indistinct; leaves of sterile shoots inequilateral and distinctly curved; inflorescence at first capitate, becoming elongated; pedicels very short, indistinct in flower, much shorter than half length of fruiting calyx; calyx tubular-campanulate, 3.25–3.75 mm (mostly ca. 3.5 mm) long in flower, to 4 mm in fruit, hairy, green, with lilac teeth; upper teeth long-ciliate; corolla lilac; nutlets ellipsoid, ca. 0.75 mm long. June–August. (Plate XXVIII, Figure 4.)

Mountain meadows and stony slopes. — European part: Crimea (in the mountainous part of the Peninsula, mainly in the yaila but also in other places — Alushta, Kerch Peninsula, Feodosiya, Simferopol). Endemic. Described from Crimea. Type in Leningrad.

Note. This species has also been reported for the Caucasus and for the Balkan Peninsula but, as regards the former the report is definitely incorrect and, for the latter, most probably so. It should be mentioned that there is a marked difference between the author's own conception of the species, as presented in the original



description (1808), and that put forward in a later description (1819) where *Th. hirsutus* M. B. is reported for the Caucasus: this has resulted in much subsequent confusion in the synonymy relating to this species.

17. *Th. callieri* Borb. apud Velen. in Sitz. Böhm. Ges. Wiss. XXVIII (1903) 16, 24; Dubyanskii in Fedch. and Fler. Fl. Evrop. Ross. 83; Klok. and Shost. in Tr. Bot. inst. AN SSSR, I, 2, 251 and in Uch. zap. Khar'k. Gos. univ. 14, 122.

494 Subshrub; stems slender, horizontal, terminating in a fertile shoot; sterile shoots arising from stems, prostrate; flowering branches rather crowded, erect, 3–10 (15) cm long, long-haired under the inflorescence; lower leaves narrowed to a petiole, oblong-spatulate, the middle and upper sessile, linear-spatulate or linear, 10–14 (15) mm long, 1–1.5 (2) mm broad (fall leaves broader, to 3 mm); all leaves subobtusely ciliate to  $\frac{1}{3}$ – $\frac{1}{2}$  of the length, markedly inequilateral and slightly curved in relation to the stem (especially on sterile shoots), the midrib prominent beneath, the lateral veins rather indistinct; inflorescence capitate at first, becoming elongate and interrupted, with distant whorls; pedicels much shorter than calyx at anthesis, equaling it in fruit; flowering calyx campanulate, 3–3.5 mm long; fruiting calyx tubular-campanulate, to 4 (5) mm long, hairy below, usually glabrous above; upper teeth long-ciliate; corolla lilac; nutlets globose, ca. 0.6 mm in diameter. (Plate XXVIII, Figure 5.)

Stony steppes and foothill slopes. — European part: Crimea (mountainous part of the Peninsula, the N. limit passing through Simferopol distr., Karasubazai, Feodosiya). Endemic. Described from the Simferopol area. Type deposited in Simferopol; cotype in many places (A. Callier, ex iter. taur. No. 697).

Note. Belenevskii as well as Ronniger report this species also for the Balkan Peninsula, but the Balkan specimens differ strikingly from the typical Crimean plants in having decidedly larger flowering calyx. Known hybrids are *Th. callieri* Borb. × *Th. pseudohumillimus* Klok. et Shost. and *Th. callieri* Borb. × *Th. tauricus* Klok. et Shost.

New species, related to *Th. callieri* Borb. described by B. M. Zefirov, *Th. karadagensis* Zefir. (in Bot. mat. XIV, 1951, 351) and *Th. holophyllus* Zefir. (l. c. 352) are also probably hybrid forms of this species and do not qualify for an independent taxonomic status.

18. *Th. zelenetzkyi* Klok. et Shost. in Tr. Bot. inst. AN SSSR, I, 2 (1936) 284 and in Uch. zap. Khar'k. Gos. univ. 14 (1938) 119.

Subshrub; stems terminating in a fertile shoot; sterile shoots lateral, arising from the stems, prostrate or trailing; flowering branches assurgent, 3–14 cm long, covered under the inflorescence with long spreading hairs; leaves oblong-elliptical, all except the lowermost without distinct petiole, (8) 12–18 (19) mm long, 1–2.75 mm (mostly ca. 2 mm) broad, ciliate right up to apex, long-haired on both sides, rather indistinctly veined, distinctly punctate-glandular; inflorescence at first capitate, at length elongate

and interrupted, with 1–3 distant whorls; pedicels distinct, in fruit longer than calyx-tube but shorter than whole calyx, short-haired, eglandular; calyx narrowly campanulate, 4–5.5 mm long, with a short, hairy tube; upper teeth long-ciliate; corolla lilac; 495 nutlets ellipsoid, ca. 1 mm long. June–July.

Mountain slopes, wood margins near upper limit. — European part: Crim. (Yaila). Endemic. Described from Ai-Petri Yaila. Type deposited in Khar'kov.

19. *Th. amictus* Klok., in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954); Vozn. rosl. URSR (1950) 427.

Subshrub; stems strongly lignified, rather stout, terminating in a fertile shoot; sterile shoots arising from stems and from rootstock, decumbent or obliquely ascending; flowering branches ascending, curved, 7–14 cm long, densely covered all over (as are sterile shoots) with long spreading hairs; leaves oblong-elliptical, cuneate at base, 8–18 mm long, 1.75–5.5 mm broad, densely covered with long and short hairs, firm, subcoriaceous, with slightly prominent veins, distinctly glandular; axillary fascicles present; lower leaves of flowering branches and most leaves of sterile shoots with a short but more or less distinct petiole, often markedly inequilateral; upper leaves sessile; inflorescence more or less elongate, interrupted, with 1–3 whorls, often branched; pedicels shorter than calyx also in fruit, hairy; upper teeth lanceolate, densely ciliate; corolla rather faintly rose-lilac; nutlets globose, 0.65–0.75 mm long, blackish. June–August.

Limestone outcrops. — European part: M. Dnp. (S. W.). Probably occurring in N. Bes. Endemic. Described from Podolia (in the vicinity of Kitai-Gorod along the Okun River). Type in Kiev; cotype in Leningrad.

Note. Apparently representing a parallel, densely-haired race of the earlier described and somewhat more widespread species *Th. podolicus* Klok. et Shost.; the two species differ, however, not only in indument. At least ten locations have been recorded for *Th. amictus* Klok. from different parts of the Podolian forest-steppe that are only partly shared with *Th. podolicus* Klok. et Shost. No intermediate forms linking these two species have been found.

A form related to *Th. amictus*, that has recently been found in the Bessarabian region, is distinguished by slightly lignified stems, larger leaves, and somewhat longer calyx (*Th. herbaceus* Klok. ined.). The taxonomic position of this form, rather distinctive in general appearance, is as yet unclear.

20. *Th. podolicus* Klok. et Shost. in Zhurn. Inst. bot. AN USSR, 9/17 (1936) 193 and in Uch. zap. Khar'k. Gos. univ. 14 (1935) 121; Klok. in Vozn. rosl. URSR, 427. — 496 Ic.: Klok. and Shost., op. cit. (1936) Fig. 1.

Subshrub; stems rather slender, terminating in a fertile shoot; sterile shoots arising from stems and rootstock, prostrate or obliquely ascending; flowering branches asurgent, 3–18 cm long, covered under the inflorescence with long spreading hairs, lower down with shorter retrorse-appressed hairs; leaves firm, coriaceous, elliptical or oblong-elliptical, narrowed toward base but without a distinct petiole, 7–20 mm long, 1.5–5.5 mm broad, ciliate to  $\frac{1}{4}$ – $\frac{1}{3}$  the length, glabrous, more or less prominently

veined, rather indistinctly glandular; axillary fascicles often present; basal leaves small, oblong, sessile; cauline leaves all sessile or the lower obscurely petiolate; leaves of sterile shoots more often obscurely petiolate; inflorescence elongate, interrupted, with 1–3 (5) whorls, often also capitate, 1–8 cm long, often branched; pedicels shorter than calyx; calyx 2.5–3.5 mm long in flower, to 4–4.5 mm in fruit, hairy, the upper teeth ciliate; corolla lilac, short-haired outside and inside; nutlets subglobose, 0.6–0.7 mm long, dark brown. June–August.

Stony slopes with outcrops of limestone, chalk, shale or granite. — European part: M. Dnp. (S. W.). Endemic. Described from Kamenets-Podolsk area. Type in Kiev.

Note. At present some dozens of locations are known in the Podolian forest-steppe, between Dniester and S. Bug.

21. *Th. markhotensis* Malejev in Izv. Gl. bot. sada SSSR, XXIX, 3–4 (1930) 126. — *Th. euxinus* Ronn. in Fedde, Repert. XXXI (1932) 147 and in Grossg. Fl. Kavk. III, 341, quoad plantam caucasicam, non H. Braun apud Zelenetskii, Mat. dlya fl. Kryma (1906) 340.

Subshrub, rather densely caespitose; stems terminating in a fertile shoot; sterile shoots arising from stems and from rootstock, ascending or prostrate, to 20 cm long; flowering branches 10–20 cm long, densely covered down to base with long spreading hairs; leaves petiolate, oblong-elliptical, 10–20 mm long, 3–5 mm broad, long-ciliate all round, long-haired on both sides, with prominent lateral veins, distinctly and profusely punctate-glandular, coriaceous, inequilateral, mostly curved; inflorescence at first oblong-capitate, becoming strongly elongated and interrupted, with several distant  
497 whorls, to 6–8 cm long; calyx ca. 4 mm long in flower, to 6 mm in fruit, hairy all round, the upper teeth lanceolate, acute, profusely long-ciliate; corolla 5–6 mm long, rose-lilac, pale, copiously hairy outside. Second half of May to July.

Mountain slopes, on limestone. — Caucasus: W. Transc. (Mt. Markhot and Mt. Mikhailovka above Gelendzhik). Endemic. Described from Mt. Markhot. Type in Leningrad.

Note. V. P. Maleev, who described this species, relates it to the S. Ukrainian *Th. dimorphus* Klok. et Shost. pointing out, among others, that (as opposed to *Th. dimorphus*) it does not display any pronounced dimorphism. It is more closely related to *Th. litoralis* Klok. et Shost., later described from Arabat Spit in Crimea, which also has hairy leaves; but it probably approaches most closely the E. Transcaucasian *Th. tiflisiensis* Klok. et Shost. in which the leaves are glabrous but broader than those of *Th. dimorphus* Klok. et Shost. The species *Th. euxinus* Ronn. (non H. Braun), described from Bulgaria, is certainly related but, contrary to Ronninger's view, not identical.

22. *Th. bulgaricus* (Dom. et Podp.) Ronn. in Fedde, Repert. Beih. XXX, 2 (1930) 352, p. p.?; Grossg. Fl. Kavk. III, 341, excl. syn. *Th. glaucus* var. *bulgaricus*. Dom. et Podp. in Verh. Z.-B. Ges. 51 (1902) 670.

Subshrub, with short stems terminating in a fertile shoot; sterile shoots arising from stems, at least some decumbent; flowering branches assurgent at base or erect,



10–20 cm long, covered all over with rather short recurved hairs; leaves short-petioled, mostly oblong-lanceolate, 10–15 mm long, 2–3 (4) mm broad, ciliate in lower third, prominently veined; inflorescence usually interrupted; pedicels short-haired; calyx 3.5–5 mm long; corolla one-and-a-half times as long as calyx, rose-lilac. June–July.

Mountain slopes at middle altitudes. — Caucasus: S. and E. Transc. **Gen. distr.:** Bal.-As. Min. (Balkan Peninsula). Described from Bulgaria. Type in Brno (?).

Note. The identity of the Transcaucasian plant with the typical Bulgarian is very dubious. The latter has a markedly smaller calyx.

23. *Th. tiflisiensis* Klok. et Shost. in Tr. Bot. inst. AzFAN, II (1938) 307.

Subshrub with rather long stems terminating in a fertile shoot; sterile shoots arising from stems or from rootstock numerous, decumbent; flowering branches assurgent at base, 9–15 cm long, hairy under the inflorescence, the hairs spreading, shorter than stem diameter; leaves firm, coriaceous, short-petioled, oblong-elliptical, (9) 11–17 (20) mm long, (2) 2.5–4 (4.75) mm broad, with length/width index (2.7) 3.1–4.7, mostly 13–14 mm long, 3–4 mm broad, subobtusate to acuminate, ciliate only to base, rarely to middle of blade, glabrous, with small papillae extending to the margin, prominently veined beneath; venation camptodromous, on some leaves pseudomarginal; punctate glands rather indistinct; inflorescence elongated, interrupted from early stage of flowering; dichasia distinctly peduncled; pedicels distinctly hairy; calyx ca. 4 mm long in flower, hairy all round or subglabrous above; upper teeth sharp-angled, ciliate; corolla 6–7 mm long, hairy outside, the tube whitish, the limb pale lilac with darker speckles; nutlets subglobose, ca. 0.6 mm long. May–June.

Stony slopes. — Caucasus: E. Transc. Endemic. Described from Ak-Bulak Distr., GrSSR. Type deposited in Khar'kov.

24. *Th. elisabethae* Klok. et Shost. in Tr. Bot. inst. AzFAN, II (1936) 307.

Subshrub; stems long, rooting, terminating in a fertile shoot; sterile shoots arising from stems, numerous, short, prostrate; flowering branches numerous, erect, 3–5.5 cm long, hairy under the inflorescence, the hairs long, exceeding stem diameter, spreading; leaves petiolate, oblong-elliptical, (9.5) 10–12 (15) mm long, (2) 2.25–3 (3.5) mm broad, with length/width index 3.3–4.3 (4.7), with dense long hairs on both sides, prominently veined and distinctly punctate-glandular beneath; inflorescence oblong-capitate or interrupted, with few distant whorls; pedicels shorter than calyx, covered with short spreading hairs; calyx campanulate, 3–3.5 mm long (in flower), long-haired, the upper teeth lanceolate, ciliate; corolla ca. 5 mm long, pale lilac. June.

Mountain-steppe slopes. — Caucasus: Cisc. (W.). Endemic. Described from Kuban (pass from River Khuda to Grushevoi Bridge). Type in Leningrad.

Note. An insufficiently explored species, so far known only from a single location and needing further study. Closely related to *Th. markhotensis* Malejev, but readily distinguishable by low growth and smaller dimensions of all plant parts.

25. *Th. litoralis* Klok. et Shost. in Tr. Inst. bot. AN USSR, 1 (1935) 113 and in Uch. zap. Khar'k. Gos. univ. 14 (1938) 121.

499 Subshrub; stems rather short, horizontal, terminating in a fertile shoot; sterile shoots arising from stems, together with fertile shoots, assurgent; flowering branches to 15 cm long, hairy to base, the spreading hairs exceeding stem diameter; leaves oblong-elliptical, distinctly petiolate, 9–15 mm long, 1.75–3 (mostly 2) mm broad, long-haired on both sides, prominently veined beneath, rather indistinctly punctate-glandular; lower cauline leaves elliptical, the petiole slightly shorter than blade; inflorescence elongated, interrupted; pedicels shorter than calyx, elongating in fruit, long-haired, calyx (3) 3.5–3.75 mm long in flower, 4–4.25 mm in fruit; upper teeth long-ciliate; corolla rather faintly rose-lilac. June.

Coastal sands. — European part: Crimea (on Arabat Spit). Endemic. Described from the location indicated. Type deposited in Khar'kov has been lost; neotype in Kiev.

26. *Th. jailae* (Klok. et Shost.) Stank. in Stank. and Tal. Opred. rast. (1949) 846. — *Th. dimorphus* var. *jailae* Klok. et Shost. in Tr. Bot. inst. AN SSSR, I, 2 (1936) 284. — *Th. dimorphus* ssp. *jailae* Klok. et Shost. in Uch. zap. Khar'k. Gos. univ. 14 (1938) 121.

Subshrub densely caespitose; stems more or less branched, terminating in a fertile shoot; sterile shoots arising from stems and directly from rootstock, trailing, prostrate or assurgent; flowering branches ascending or assurgent, rarely erect, (4) 10–15 cm long, covered under the inflorescence with long spreading hairs, the lower part of stem with sparser shorter recurved hairs; leaves oblong-elliptical, sessile or subsessile, 12–18 (21) mm long, 1.5–2.5 (3) mm broad, cuneate at base, only the lowest minutely petiolate, ciliate to one-third, glabrous, the lateral veins and glands rather indistinct; inflorescence elongate-capitate; pedicels shorter than calyx, eglandular; calyx narrowly campanulate, 3.5–4.5 (5) mm long, mostly dark lilac, hairy below, glabrous above; upper teeth long-ciliate; nutlets short-ellipsoid, ca. 0.75 mm long, dark brown. June–July.

Taluses, grass-covered mountain slopes, wood margins near the upper forest limit. — European part: Crimea (Yaila). Endemic. Described from Nikitskaya Yaila. Type deposited in Khar'kov has been lost; neotype in Leningrad.

Note. An insufficiently explored species; further collections needed. Cannot be identified with *Th. dimorphus* Klok. et Shost. because of morphological as well as 500 geographic considerations. The independent status of this species seems to have recently received final confirmation as a result of Yuzepchuk's observations.

27. *Th. dimorphus* Klok. et Shost. in Tr. s.-g. bot. I, 3 (1927) 122; in Visn. Kiivs'k. bot. sadu, XVI (1932) 14 and in Uch. zap. Khar'k. Gos. univ. 14 (1938) 120; Klok. in Vizn. rosl. URSR, 427. — *Th. bulgaricus* Ronn. in Fedde, Repert. XXXI, 2 (1932) 145–146, ex p. non in XXX, 2 (1930) 352. — *Th. maeoticus* Zefir. in Bot. mat. gerb. Bot. inst. AN SSSR, XIV (1951) 354.

Subshrub, rather densely caespitose; stems terminating in a fertile shoot; sterile shoots arising from stems and directly from rootstock, decumbent, to 30 cm long,

flowering branches assurgent or ascending, 5–23 cm long, covered under the inflorescence with long spreading hairs; leaves short-petioled, oblong-elliptical to linear-elliptical, (9) 12–25 (28) mm long, (1) 1.5–4 (5) mm broad, with length/width index 4.5–10, gradually narrowed to petiole 2–2.5 mm long, obtuse at apex, ciliate only at base, glabrous, usually dark green, firm, with somewhat revolute margins, often (especially the lower) laterally curved; lateral veins prominent; glands few but large, conspicuous; axillary fascicles developed, particularly on sterile shoots; inflorescence elongate-capitate or interrupted, to 10 cm long, with 5–6 distant whorls, the lower whorls to 3.5 cm apart; pedicels distinct, short-haired, sometimes with some glandular hairs; calyx tubular-campanulate, (3) 3.5–5 mm long in flower, 4–5.5 mm in fruit, the tube elongate, hairy, the upper teeth lanceolate, acute, subequal, long-ciliate; corolla 5–7 mm long, with narrow tube ca. 2 mm long, larger and more intensely rose-lilac in hermaphrodite flowers (generally speaking, hermaphrodite and female specimens differ from each other in all parts more conspicuously than in other species of the genus); nutlets short-ellipsoid, 0.75–1 mm long, black. Second half of May to first half of August. (Plate XXVIII, Figure 2.)

Stony steppes, various rock outcrops (especially crystalline), coastal sands, loess bluffs. — European part: M. Dnp. (extreme S.), Bl., L. Don (S.), Crim. (Arabat Spit); Caucasus: Cisc. (N. limit). Endemic. Described from the vicinity of Zhdanov. Type in Kiev.

Note. Forms a wide range of crosses with *Th. marschallianus* Willd., *Th. cal-*  
501 *careus* Klok. et Shost., *Th. pallasianus* H. Braun, *Th. moldavicus* Klok. et Shost., but clearly retains its position as a characteristic plant of the southern steppes and often typifying the plant formation of stony steppes (*Thymetum dimorphi*).

More recent observations point to a certain heterogeneity of this species. Specimens from the S. W. part of the distribution area, more particularly from the Odessa area, are apparently distinguishable from typical plants by broader leaves and rather pronounced heterophylly (*Th. odessanus* Klok. ined.).

*Th. maeoticus* Zefir. (Bot. mat. gerb. Bot. inst. AN SSSR, XIV, 1951, 354), described by B. M. Zefirov from Arabat Spit in Genichesk distr. as a new species, does not differ from typical *Th. dimorphus* as far as can be judged from the specimen deposited by the author in the herbarium of the Botanical Institute of the USSR Academy of Sciences and by other plants collected in the same location. When describing *Th. litoralis* from Arabat Spit (see above), we already pointed out in 1935 that it occurs together with *Th. dimorphus*.

28. *Th. klokovii* (Ronn.) Shost. in Uch. zap. Khar'k. Gos. univ. 6–7 (1936) 293. — *Th. glaucus* ssp. *klokovii* Ronn. in Fedde, Repert. XXXI (1932) 148 and in Grossg. Fl. Kavk. III, 342.

Subshrub, with stems terminating in a fertile shoot; sterile shoots arising from stems or from rootstock, prostrate or trailing; flowering branches to 10 cm long, short-haired; leaves short-petioled, coriaceous, narrowly oblong, 10–20 mm long, ca. 2 mm broad, sparingly ciliate at base, glabrous; lateral veins 2 pairs, almost parallel, thick, prominent; glands small, but numerous and distinct; inflorescence elongate, 2–3 cm long, interrupted; calyx ca. 5 mm long in flower, long-haired below, short-pubescent above, the



tube ca. 2 mm long, the upper teeth narrowly lanceolate, ca. 1.75 mm long, long-ciliate; corolla 7–8 mm long, lilac-pink. June–July.

Dry mountain slopes. — Caucasus: S. and E. Transc. (S). Endemic. Described from Transcaucasia. Type in Baku.

29. *Th. turczaninovii* Serg. in Animadv. syst. ex Herb. Univ. Tomsk. No. 1–2 (1936) 4.

Subshrub; stems rather slender or fairly stout, terminating in a fertile shoot; sterile shoots arising from stems, prostrate or trailing, 5–12 cm long; flowering branches ascending, 3–12 cm long, hairy to base; hairs on fertile and sterile shoots long, exceeding stem diameter, spreading or slightly retrorse; leaves mostly oblong-elliptical or rare-  
502 ly oblong-ovate, 5–11 mm long, 1–3.5 mm broad, cuneately narrowed to a short petiole or sessile, with length/width index 2.5–5, often denticulate, with 1–2 pairs of denticulations on both sides, rather densely covered with long and short hairs; lateral veins 2–3 pairs, slightly prominent; glands distinct; lower leaves on flowering branches shorter but broader than the middle, obovate or rounded-rhomboid, with petiole about half the length of blade; upper leaves sessile; leaves on sterile shoots all oblong-elliptical, with a very short but distinct petiole, usually upright and often inequilateral; inflorescence at first capitate, finally elongate, with 2–3 distant whorls; pedicels 1–4 mm long, with patent hairs; calyx tubular-campanulate, 3.5–4.5 mm long, hairy; upper teeth lanceolate or triangular-lanceolate, ciliate; corolla rose-lilac, 6–7 mm long; nutlets short-ellipsoid, 0.75–1 mm long, to 0.75 mm across, black. June–July.

Limestone outcrops. — E. Siberia: Dau. Endemic. Described from Gazimir-Zavodsk area (Yamkun spa). Type in Tomsk.

30. *Th. przewalskii* Kom. nom. in schedis. — *Th. serpyllum* var. *prezwalskii* Kom. Fl. Man'chzh. III (1907) 379.

Subshrub; stems rather thick, woody, terminating in a fertile shoot; sterile shoots arising from stems or sometimes from rootstock, prostrate or trailing; flowering branches 4–15 cm long, usually assurgent, hairy to base, the hairs long, exceeding stem diameter, spreading or retrorse; leaves oblong-elliptical or elliptical, gradually narrowed toward base but without distinct petiole, 2.5–14 mm long, 1–5.5 mm broad, with length/width index 1.6–4.5, often with 2–3 pairs of denticulations, hairy on both sides; lateral veins 3 pairs, slightly prominent; glands distinct; lowermost leaves small, crowded at base of branches, short-petioled; middle cauline leaves two-fifths to one-half the length of internodes, subrhomboidal; inflorescence at first capitate,  
505 finally elongating, often with 1–2 distant whorls; pedicels to 3 mm long, short-haired; calyx tubular-campanulate, 4.5–7 mm long, green, hairy, glabrous only under the teeth; upper teeth lanceolate, ciliate; corolla twice as long as calyx, rather faintly rose-lilac; nutlets subglobose, 0.7–0.8 mm in diameter, dark brown. July–August.

Coastal sands. — Far East: Uss. (S.). Gen. distr.: China (not ascertained). Described from the shores of Lake Khanka. Type in Leningrad (?).

Note. Although it is quite possible that *Th. przewalskii* Kom. occurs in the adjoining areas of Manchuria or N. Korea, it is more likely that it is endemic on the

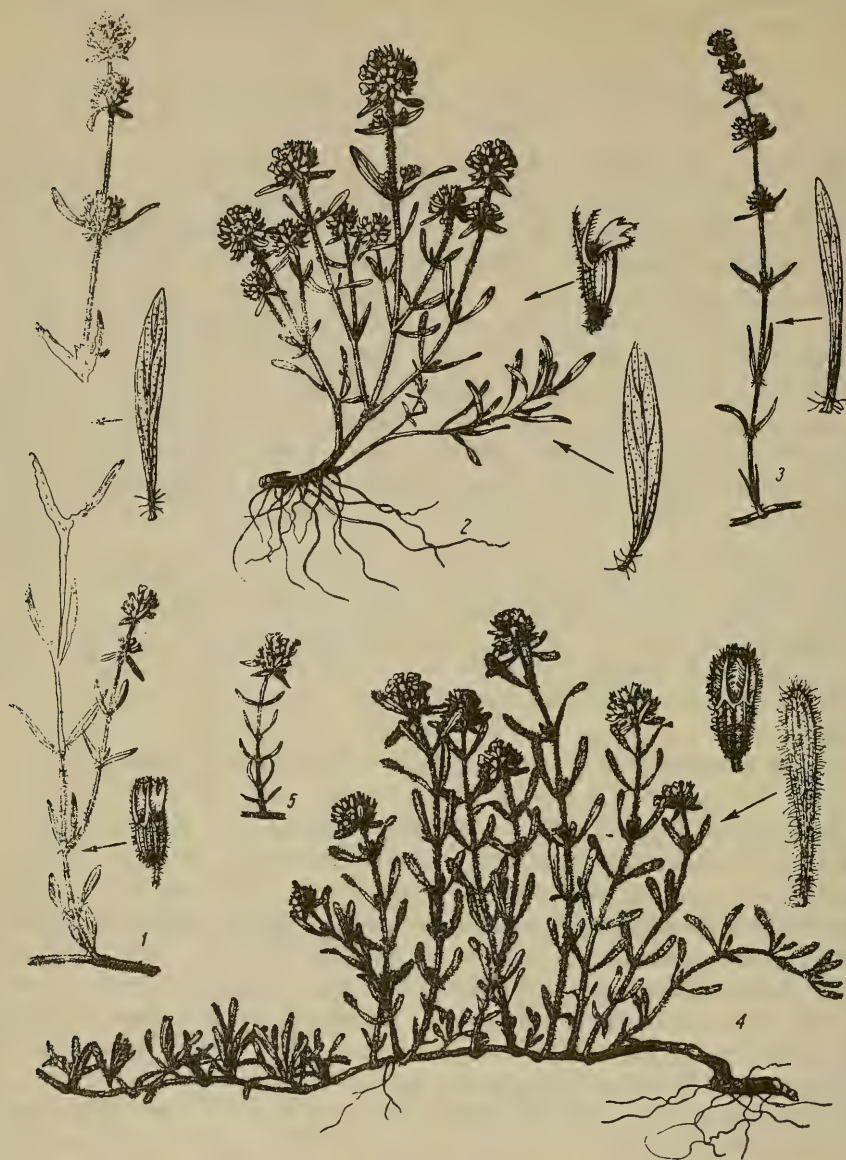


PLATE XXVIII. 1 – *Thymus czernjaevii* Klok. et Shost., plant fragment, leaf, calyx; 2 – *Th. dimorphus* Klok. et Shost., plant fragment, calyx, leaf; 3 – *Th. stepposus* Klok. et Shost., branchlet and leaf; 4 – *Th. hirsutus* M. B., plant fragment, leaf, calyx; 5 – *Th. callieri* Borb., branchlet.

shores of Lake Khanka. In any case, related species described from N. China (*Th. mand-schuricus* Ronn., *Th. quinquecostatus* Celak.) differ from it rather strikingly. The shores of Lake Khanka are also inhabited by another species, *Th. chankoanus* Klok. (probably also endemic), and by hybrids between it and *Th. przewalskii*.

31. *Th. coriifolius* Ronn. in Fedde, Repert. Beih. XXX, 2 (1930) 147; Grossg. Fl. Kavk. III, 341.

Subshrub; stems mostly very long, slender, terminating in a fertile shoot; sterile shoots arising from the stems, at least some of them decumbent; flowering branches 3–7 cm long, disposed along the stem in regular rows, densely covered with short recurved hairs; leaves petiolate, oblong-lanceolate, markedly increasing in size toward summit, glabrous, prominently veined beneath, with rather indistinct glands; basal leaves small, crowded at base of branches, ca. 3 mm long and 1 mm broad; cauline leaves 7–13 mm long, 2–4 mm broad; inflorescence usually capitate, dense; pedicels considerably shorter than calyx, short-haired, calyx 3–4 (5) mm long, hairy all round, the upper teeth lanceolate, ca. 1 mm long, ciliate; corolla slightly longer than calyx, pale pink, copiously hairy outside. June–July.

Mountain slopes at middle altitudes. — Caucasus: S. and E. Transc. Endemic. Described from the Tbilisi area. Type in Baku.

Series 2. *Heterophylli* K. Lyka in Hegi, III. Fl. V. (1928) 54; emend. Klok. and Shost. in Uch. zap. Khar'k. Gos. univ. 6–7, 293 and 14, 123. — Stems terminating in a fertile shoot, short and slightly lignified; sterile shoots arising from stems, assurgent, ascending or prostrate; leaves differentiated, the lower cauline with more rounded blade, long-petioled, markedly differing from the upper (heterophyly); calyx 3–4.5 mm long.

This species consists mainly of North Pontic and Pannonian xero-mesophytic forest-steppe species.

32. *Th. czernjaevii* Klok. et Shost. in Tr. s.-g. bot. I, 3 (1927) 118, ("Tschernjajevi"); emend. Klok. and Shost. in Visn. Kiivs'k. bot sadu, XVI, 12; Uch. zap. Khar'k. Gos. univ. 14, 123; Klok. in Viznachn. rosl. URSR, 427. — *Th. marschallianus* var. *citriodorus* Illitsch. in Bot. mat. gerb. Bot. inst. AN SSSR (1924) 8, non Kasakevitsch.

Perennial; stems terminating in a creeping shoot; sterile shoots arising from stems, ascending or prostrate, usually shorter than the fertile; flowering branches assurgent or erect, (6) 10–20 (22) cm long, covered with long spreading hairs to the very base; leaves petiolate, oblong-elliptical (except the lowermost), (9) 13–21 (23) mm long, (2) 3–5 (5.75) mm broad, cuneate at base, narrowed to a short petiole, obtuse or rounded at apex, ciliate to  $\frac{1}{3}$  –  $\frac{1}{2}$ , glabrous or occasionally sparsely hairy (f. *hirsutus* Klok. et Shost.), with distinct lateral veins and glands; lower leaves broad-elliptical, small, with petiole as long as blade, somewhat coriaceous, firm; inflorescence elongate, usually interrupted; pedicels as long as calyx or somewhat longer in fruit, covered with short hairs and small stipitate glands; calyx campanulate, 3–3.5 mm



long in flower, to 4 mm in fruit, the tube short; the upper teeth triangular-lanceolate, acute, long-ciliate; corolla lilac; nutlets short-ellipsoid, ca. 0.75 mm long. June–September. (Plate XXVIII, Figure 1.)

Pine woods and mixed forests (thinned out dry places), grass-covered sands that have undergone partial humification. — European part: M. Dnp., V.-Don (W. part), L. Don (N. W. part). Endemic. Described from the vicinity of Khar'kov. Type in Kiev.

Note. This species has a completely delimited distribution area within the forest-steppe and northern steppe belt of the European part of the U.S.S.R. Its very common crosses with *Th. pallasianus* H. Braun form a highly diversified range. To the *Th. czernjaevii* Klok. et Shost.  $\times$  *Th. pallasianus* H. Braun hybrid group we also refer *Th. kelleri* Popov (in yubil sborn. "25 let pedagog. i obshch. raboty akad. B. K. Kellera," 1931, 8–9). The first to draw attention to *Th. czernjaevii* Klok. et Shost. was V. M. Chernyaev (*Th. marschallianus* var. *subulicola* Czern. in schedis, *Th. ammophilus* Czern. in schedis), but he did not distinguish it clearly enough from the above-mentioned hybrid forms. Beside the crosses with *Th. pallasianus* H. Braun, 507 the hybrids *Th. czernjaevii* Klok. et Shost.  $\times$  *Th. ucrainicus* Klok. and  $\times$  *Th. marschallianus* Willd. are much less frequent.

33. *Th. loevyanus* Opiz in Naturalientausch No. 9 (15 VIII 1824) 105; Klok. and Shost. in Visn. Kiivs'k. bot. sadu, XVI, 8; Uch. zap. Khar'k. Gos. univ. 14, 124. — *Th. glabrescens* var. *Lövyanus* Lyka apud Hegi, III. Fl. V, 3 (1928) 2314; Ronn. in Fedde, Repert. XXX, 2, 353.

Subshrub; stems slender or fairly slender, creeping, terminating in a fertile shoot; sterile shoots lateral, arising from stems, assurgent or ascending, shorter than fertile shoots; flowering branches obscurely 4-angled, erect or ascending at base, 10–20 (30) cm long, densely covered under the inflorescence with long spreading hairs, in lower part with short hairs sometimes intermixed with long ones, some stem internodes usually glabrous or subglabrous on two sides; leaves short-petioled, elliptical or oblong-elliptical, (7) 12–17 (19) mm long, (2) 3–6 (9.5) mm broad, obtuse or sub-obtuse, ciliate to one-third, the upper sometimes to one-half, glabrous; lateral veins and glands rather indistinct; lowermost cauline leaves much smaller, long-petioled, suborbicular, the petiole nearly as long as blade; middle leaves on flowering branches one-fifth to one-half the length of internodes; axillary fascicles obsolescent or wanting; inflorescence interrupted throughout, (2.5) 3–6 cm long; distant whorls 2 or 3; calyx campanulate, 3–4 (4.5) mm long at anthesis; upper calyx-teeth acutely triangular, profusely long-ciliate; corolla one-and-a-half times as long as calyx, rather intensely colored. June–July.

Openings and margins of hornbeam and oak forests, stony outcrops and steppe slopes, meadow steppes. — European part: U. Dns. (southern forest-steppe districts), Bes. (N.), M. Dnp. (the right bank of the Dnieper to River Ros' in the East). Gen. distr.: Centr. Eur. (S.), Bal.-As. Min. (E. Yugoslavia). A Pannonian-West Pontic forest-steppe species. Described from the close vicinity of Prague. Type in Vienna.

34. *Th. glacialis* Klok. in Bot. mat. gerb. bot. inst. AN SSSR, XVI (1954).

A slightly lignified subshrub; stems slender, terminating in a fertile shoot; sterile shoots arising from stems, assurgent; flowering branches assurgent, 5–12 cm long, densely covered with short and fairly long retrorse or recurved hairs (predominant in lower and upper part respectively), yellowish; leaves ovate to elliptical or oval-rhomboid, cuneate at base and narrowed to a short or shortish petiole, 4–9 mm long, 1–4 mm broad, ciliate to the middle or higher up, more or less hairy above, glabrous or  
508 with isolated hairs beneath; lateral veins 3 or 4 pairs, prominent; glands scattered, distinct; lower cauline leaves on petiole half the length of blade, others short-petioled but petiole distinct even in floral leaves; inflorescence capitate, with one depauperate distant whorl; floral leaves elliptical, green; bracteoles rather conspicuous, whitish, linear-lanceolate, exceeding pedicels, these 1.5–2.5 mm long, whitish with very short copious appressed hairs; calyx tubular-campanulate, 3.5–4 mm long, green or lilac, densely hairy beneath, glabrous above; upper teeth all lanceolate, point-tipped, or the median acutely triangular, ciliate; corolla ca. 6 mm long, white or pink. July–August.

Stony places. — E. Siberia: Lena-Kol. Endemic. Described from the vicinity of Verkhoyansk. Type in Leningrad.

Note. A fairly distinctive species of uncertain affinity.

35. *Th. karamarianicus* Klok. et Shost. in Tr. Bot. inst. AzFAN, II (1936) 308.

Subshrub; stems short, slightly woody; sterile shoots erect, shorter than the fertile; flowering branches erect, 15–25 cm long, covered under the inflorescence with long spreading hairs; leaves petiolate, the middle cauline elliptical, (15) 16–22 (25) mm long, (4) 5–6.5 (80 mm broad, with length/width index (2.4) 3.1–4.5, ciliate to base of blade; lateral veins prominent; glands rather indistinct; lower cauline leaves smaller, the petiole nearly as long as the ovate blade; inflorescence oblong-capitate, with 1 or 2 distant whorls, often branched, the dichasia distinctly peduncled; pedicels long-haired; calyx campanulate at anthesis, ca. 4 mm long, long-haired, rarely subglabrous above; upper teeth lanceolate, ciliate; corolla very pale, with pale tube and lilac speckles on the limb; nutlets broadly ellipsoid, 0.6 × 0.8 mm. May–June.

Dry stony slopes. — Caucasus: E. Transc. Endemic. Described from Kyurdamir district, Azerbaidzhan SSR. Type in Baku.

Series 3. *Marschalliani* Klok. et Shost. in Uch. zap. Khar'k. Gos. univ. 6–7 (1936) 293 and 14 (1938) 126. — Stems short and slightly lignified; sterile shoots erect or assurgent at base; leaves sessile; calyx small at anthesis, 2.25–3.5 mm long; corolla usually pale, rose-lilac.

Eurasian steppe and forest-steppe species.

509 36. *Th. pannonicus* All. secus Ronn. in Fedde, Repert. XXX, 2 (1930) 352; Klok. and Shost. in Visn. Kiivs'k. bot. sadu, XVI, 11 and in Uch. zap. Khar'k. Gos. univ. 14, 126.

Subshrubs; stems short, terminating in a fertile shoot; sterile shoots arising from stems, assurgent; flowering branches (6.5) 10 cm long, covered to base with long spreading hairs; leaves oblong-elliptical, without distinct petiole, 9–14 (21) mm long, 2–4 (5) mm broad, densely covered on both sides and at margin with long subappressed hairs; inflorescence elongate, interrupted, with several distant whorls; calyx ca. 3.5 mm long in flower, to 4 mm in fruit; upper teeth long-ciliate; corolla small, rose-lilac. Fl. June–July.

Limestone outcrops. — European part: U. Dns., U. Dnp. (S. W.). **Gen. distr.:** Centr. Eur. (S.), Bal.-As. Min. (Yugoslavia and Bulgaria). Described from Centr. Europe. Type unknown to us.

Note. This species is presented here as conceived by Ronniger. The form growing in the Soviet Union is not quite typical and needs further study.

37. *Th. latifolius* (Bess.) Andr. in Izv. Kievsk. univ. No. 7 (1862) 129; Trautf. in Tr. SPb. bot. sada, IX, a, 90; Klok. and Shost. in Visn. Kiivs'k. bot. sadu, XVI, 7 and in Uch. zap. Khar'k. Gos. univ. 14, 125; Klok. in Vozn. rosl. URSR, 428 — *Th. marschallianus* var. *latifolius* Bess. Enum. pl. Volh. (1822) 24.

Perennial; stems slender, terminating in a fertile shoot; sterile shoots numerous, ascending, densely leafy; flowering branches sparingly leafy, assurgent or ascending, 15–25 cm long, covered in upper part with long spreading hairs; sterile shoots with short retrorse-appressed hairs; leaves sessile or rather indistinctly petiolate, oblong-elliptical to elliptical, (12) 15–22 (30) mm long, (1.5) 2.5–7 (9) mm broad; inflorescence elongate, interrupted, mostly branched; pedicels longer than calyx; calyx campanulate, 3–3.5 mm long in flower, to 4–4.5 (5) mm in fruit, hairy; upper teeth ciliate; corolla lilac; nutlets subglobose, ca. 0.75 mm in diameter. June–August.

Forest margins and openings, steppe and stony slopes. — European part: U. Dns. (W.), Bes. (N.). **Gen. distr.:** Centr. Eur. (E?). Described from Volyn' and Podolia. Type in Kiev.

Note. We had also referred to this species the strikingly similar North Caucasian plant (Chebretsy Kavkaza (Thymes of the Caucasus) in Tr. Bot. inst. AzFAN, II, 286) which was later set up by M.M. Il'in as an independent species. It seems that more  
510 westerly Central European forms, established as *Th. auctus* Lyka (pro subsp. *Th. serpylli*) are also distinct from *Th. latifolius* (Bess.) Andr.

38. *Th. pastoralis* Iljin in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954). — *Th. latifolius* Klok. et Shost. in Tr. Bot. inst. AzFAN, II (1936) 286, non Bess.

Perennial; stems short, ascending; flowering branches 12–30 cm long, densely covered under and in inflorescence with long spreading hairs, in lower part with short recurved hairs, rather densely leafy; leaves oblong-elliptical, cuneately narrowed toward base, without distinct petiole, 7–27 mm long, 1.5–7.5 mm broad, obtuse or subobtuse, ciliate only at base, glabrous, scabrous on the veins and along the margin above; lateral veins 3 or more often 4 pairs, slender, slightly prominent; cauline leaves about equaling internodes, with axillary fascicles; inflorescence elongate, interrupted, with 2–7 distant whorls, often branched; pedicels to 5 mm long, covered with very short



recurved and relatively long spreading hairs; calyx 3–4 (4.5) mm long, hairy all round, the upper teeth lanceolate, densely ciliate; corolla ca. 5 mm long, rose-lilac; nutlets subglobose, 0.6–0.7 mm in diameter. The whole plant intensely lemon-scented. June–July.

Mountain meadows (probably mountainous meadow-steppes). – Caucasus: Cisc. (Kislovodsk, Mineral'nye Vody). Endemic. Described from the vicinity of Kislovodsk. Type in Leningrad.

Note. The morphological differences between this Caucasian race and the typical West Ukrainian *Th. latifolius* (Bess.) Andr. are very slight, considering the considerable disjunction between the distribution areas and the marked difference in habitat conditions. M. M. Il'in draws attention to the strong lemon scent of the Caucasian species, a feature that certainly does not apply to the Ukrainian.

39. *Th. dzevanovskyi* Klok. et Shost. in Tr. Bot. inst. AN SSSR, I, 2 (1934) 227 and in Uch. zap. Khar'k. Gos. univ. 14 (1939) 127.

Perennial; stems horizontal, short, terminating in a fertile shoot; sterile shoots arising from the stems, ascending; flowering branches assurgent or erect, (3) 4–15 cm long, covered under the inflorescence with long spreading hairs; leaves sessile, oblong-elliptical, cuneate at base, subobtusate at apex, (12) 15–17 (20) mm long, 1.5–2.5 (3.5) mm broad, ciliate only at margin, glabrous; lateral veins slightly prominent; glands small 511 but numerous and rather distinct; inflorescence oblong-capitate or interrupted, with 1–2 distant whorls; pedicels shorter than calyx; calyx (2.75) 3–3.25 mm long in flower, 3.5–4 mm in fruit, hairy all round, rarely glabrous above, green or sometimes lilac, the upper teeth long-ciliate; corolla slightly exceeding calyx, lilac; nutlets subglobose, ca. 0.75 mm in diameter. June–July.

Steppe slopes, scrub. – European part: Crim. (N. foothill region and more rarely the South coast). Endemic. Described from the vicinity of Simferopol. Type deposited in Khar'kov.

40. *Th. marschallianus* Willd. Sp. pl. III (1800) 1141; V. Dubyanskii in Fedch. and Fler. Fl. Evrop. Ross. 832; Klok. and Shost. in Tr. s.-g. bot. I, 3, 114 and in Uch. zap. Khar'k. Gos. univ. 14, 127; Sergievskaya in Kryl. Fl. Zap. Sib. IX, 2391. – *Th. serpyllum* var. *marschallianus* Ldb. Fl. Ross. III (1849) 346; Shmal'g. Fl. II, 311, excl. syn. – *Th. marschallianus* var. *pseudochamaedrys* Illitsch. in Bot. mat. gerb. Bot. sada, V (1924) 8–9.

Perennial; woody stems short or often obsolescent; sterile shoots assurgent at base or erect; flowering branches 12–37 cm (mostly ca. 25 cm) long, covered under the inflorescence with long spreading hairs, in lower part with short recurved hairs; leaves sessile, oblong-elliptical, (12.5) 15–24 (30) mm long, 2.5–5 (7.5) mm broad, cuneate at base, subacuminate, light green, thin, sparsely ciliate at margin and at base, glabrous or sometimes sparsely hairy (f. *hirsutus* Klok. et Shost.); lateral veins rather indistinct; glands numerous but small and rather indistinct; inflorescence usually elongate, to 15 (18) cm long, interrupted, with up to 7 or more distant whorls; pedicels nearly as long as calyx, hairy; calyx campanulate, (2) 2.25–2.75 (3) mm long in flower, mostly

ca. 2.5 mm, 3–3.5 mm in fruit, with a short hairy tube; upper teeth sharp-angled, subequal, long-ciliate; corolla infundibular, ca. 5 mm long, pale lilac, with indistinct tube; nutlets globose, 0.5–0.7 mm in diameter, almost black. Second half of May to August.

Meadow and mountain steppes, steppe slopes, wood margins and openings in steppe oak woods, rarely stone outcrops. — European part: U. Dns. (E.), U. Dnp. (S.), U. V. (S.), V.-Kama (S.), M. Dnp., V.-Don, Bes., Bl., L. Don, Transv., L. V., Crim. (very rarely, as adventive); Caucasus: Cisc. (N.); W. Siberia: in the forest-steppe and steppe belt of all the regions; Centr. Asia: Ar.-Casp. (N.), Balkh. (N.), T. Sh. **Gen. distr.:** reported for Centr. Eur. and N. part of the Balkan Peninsula, but all the specimens that we were 512 in a position to examine were found to belong to other related species or proved to be hybrid forms of diverse origin. Described from S. Ukraine (Tavrisheskaya Bay). Type in Berlin.

41. **Th. stepposus** Klok. et Shost. in Zhurn. Inst. bot. AN URSSR, 9/17 (1936) 104 in Uch. zap. Khar'k. Gos. univ. 14 (1938) 128. — **Ic.:** Klok. and Shost., op. cit. (1936) Fig. 2.

Perennial; stems short, terminating in a fertile shoot; sterile shoots arising from the stems, assurgent or erect; flowering branches erect or assurgent, 6–16 cm long, rather densely covered under the inflorescence with long spreading hairs; leaves linear, without distinct petiole, (7) 8–15 (16) mm long, 1.25–1.75 (2) mm broad, only at base with few rather short cilia; lateral veins 2–3 pairs, prominent; glands relatively large, distinct; inflorescence more or less elongate, interrupted, often branched; calyx campanulate, 2.25–2.5 mm long, densely hairy; upper teeth ciliate; corolla small, pale lilac; nutlets ellipsoid, ca. 0.6 mm long and 0.4 mm broad, brown. June–July. (Plate XXVIII, Figure 3.)

Stony steppes. — European part: Transv. (S. E.), V.-Kama (S.); W. Siberia: U. Tob. (W.). Endemic. Described from the vicinity of Menzelinsk in Tatar ASSR. Type in Leningrad.

Note. A S. Uralian steppe species, so far known from few locations but morphologically quite distinct from *Th. marschallianus* Willd. and other species of the same series.

42. **Th. lavrenkoanus** Klok. in Bot. mat. gerb. Bot. inst. AN SSSR XVI (1954).

Subshrub, with slightly lignified slender branched stems terminating in a fertile shoot; sterile shoots arising from the stems, assurgent; flowering branches assurgent, 3–10 cm long, very slender, hairy, the hairs under the inflorescence to 1 mm long, spreading, toward the base of branches sparser, shorter, recurved; leaves narrowly oblong-elliptical or linear-oblong, 3–11 mm long, 0.7–1.5 mm (exceptionally to 2 mm) broad, ciliate, often up to apex, covered on both sides with fairly long and very short hairs; lateral veins 2 pairs, rather indistinct or indistinguishable; glands rather indistinct; lower and middle leaves on flowering branches with revolute margins; inflorescence capitate, on the stronger branches often with a depauperate distant whorl; 513 lower floral leaves oblong-lanceolate, subobtus, to 1.75 mm broad; pedicels to 2 mm long, hairy; calyx narrowly campanulate, 3–3.5 mm long at anthesis, hairy all over;

upper teeth narrowly lanceolate, acute, long-haired at margin; corolla not more than one-and-a-half times as long as calyx, rather dull lilac-pink. June–July.

Stony slopes. — W. Siberia: Irt. Endemic. Described from Beshagach (Pavlodar district). Type in Leningrad.

Section 3. *Euserpyllum* Klok. — *Grex Euserpyllum* Klok. et Shost. in Uch. zap. Khar'k. Gos. univ. 6–7 (1936) 295 and 14 (1938) 128. — Stems terminating in a decumbent sterile shoot, much more rarely in a fertile shoot (Far Eastern and E. Siberian species); indument of stem under the inflorescence usually consisting of rather long hairs, rarely short and recurved (Central Asian mountain species); leaves always petiolate, mostly oblong-elliptical, the venation camptodromous (in all our species); inflorescence capitate; upper calyx-teeth usually with ciliate margin; corolla lilac, rarely whitish.

Eurasian species, occurring in the forest and tundra zones in the lowlands as well as in high mountain zones, largely associated with coniferous forests (taiga).

The most difficult group of the genus. The complexity of its taxonomic composition was first brought to light by the studies of L. P. Sergievskaya.

We had to exclude from our treatment *Th. pavlovii* Serg. (in *Sistem. zam. Gerb. Tomsk. Gos. univ.*, 1–2, 1933, 10), as we had no herbarium material at our disposal. According to the author, this species “somewhat recalls *Th. jennisensis* Iljin in leaf shape, but differs markedly in its leaves being hairy on both sides and narrower (1.5–3.5 broad, as against 4–8).” We are not in a position to form a clear idea concerning the systematic position of this plant on the basis of a single description.

The species *Th. dahuricus* Serg. (in *Sistem. zam. gerb. Tomsk. Gos. univ.* 1, 1938, 3), to judge by the description and the specimens supplied by the authority, would seem to be a hybrid between one of the species of this section and a species of the section *Gonio-trichi*.

- |       |   |                                    |
|-------|---|------------------------------------|
| 1.    | Stems terminating in an assurgent fertile shoot (rarely sterile and then also assurgent); leaves short-petioled (the petiole of lower cauline leaves not more than half the length of blade), mostly long-haired on both sides, rarely glabrous and then only 0.75–1.75 mm broad (Far East, E. Siberia) | 2.                                 |
| 514 + | Stems terminating in a decumbent sterile shoot; leaves with short or fairly long petiole, the lower often with petiole as long as blade, glabrous or hairy  | 7.                                 |
| 2.    | Leaves glabrous, narrow   | 52. <i>Th. minussinensis</i> Serg. |
| +     | Leaves hairy  | 3.                                 |
| 3.    | Leaves narrow, oblong or linear-elliptical, 0.75–2 mm broad   | 51. <i>Th. bituminosus</i> Klok.   |
| +     | Leaves oblong-elliptical, elliptical or ovate, 1.5–4.5 and to 6 mm broad  | 4.                                 |
| 4.    | Middle cauline leaves twice as long as internodes, ovate  | 44. <i>Th. ussuriensis</i> Klok.   |
| +     | Middle cauline leaves shorter than internodes, mostly elliptical  | 5.                                 |
| 5.    | Flowering branches 5–7 cm long, covered under the inflorescence with recurved or reclinate hairs not exceeding stem diameter  | 45. <i>Th. ochotensis</i> Klok.    |
| +     | Flowering branches to 15–20 cm long; hairs under the inflorescence twice diameter of stem   | 6.                                 |



6. Flowering branches long-haired all over; leaves mostly oblong-elliptical, to 15 mm long . . . . . 43. *Th. amurensis* Klok.
- + Flowering branches short-haired in lower part; leaves mostly elliptical, to 10 mm long (width as in preceding species) . . . . . 46. *Th. flexilis* Klok.
- 7 (2). Lower cauline leaves with petiole not exceeding half length of blade (heterophylly absent or slight) . . . . . 8.
- + Lower cauline leaves with petiole as long or nearly as long as blade (heterophylly very pronounced) . . . . . 31.
8. All or many cauline leaves distinctly denticulate . . . . . 9.
- + Leaves entire . . . . . 12.
9. Leaves grayish with copious short hairs . . . . . 56. *Th. crenulatus* Klok.
- + Leaves glabrous or subglabrous . . . . . 10.
10. Leaves (except the lowermost) subsessile, with indistinct petiole, inequilateral . . . . . 50. *Th. inaequalis* Klok.
- + All leaves distinctly petiolate, equilateral . . . . . 11.
11. Leaves dark green, lustrous, prominently veined beneath; calyx tube prominently nerved . . . . . 49. *Th. nervulosus* Klok.
- + Leaves light green, dull, the veins not prominent; calyx-tube not prominently nerved . . . . . 47. *Th. chankoanus* Klok.
- 12 (8). Flowering branches 1.5–2.5 cm long; leaves 2–5 mm long, 0.5–1.5 mm broad, without discernible lateral veins, glabrous beneath, with sparse but relatively very long hairs above . . . . . 53. *Th. eravinensis* Serg.
- 515 + Flowering branches longer; leaves large, more or less prominently veined, hairy on both sides or else glabrous both above and beneath . . . . . 13.
13. Leaves rather densely hairy on both sides . . . . . 14.
- + Leaves glabrous (or rarely, in annotinous specimens, slightly hairy). . . . . 18.
14. Leaves covered exclusively with short hairs; lateral veins on leaf underside prominent . . . . . 54. *Th. eubajcalensis* Klok.
- + Leaves covered only with long or with long and short hairs; lateral veins on leaf underside inconspicuous . . . . . 15.
15. Calyx 3 mm long at anthesis; high-mountain plants of Altai . . . . . 57. *Th. narymensis* Serg.
- + Calyx larger, 3.5–5.5 mm long . . . . . 16.
16. Leaves ovate, densely covered with long spreading hairs (Altai) . . . . . 58. *Th. schischkinii* Serg.
- + Leaves oblong-elliptical to obovate, with rather sparse hairs; other regions . . . . . 17.
17. Lower cauline leaves approximate at the base of branches, distant from middle leaves; pedicels 2–4 mm long; calyx 4–5.5 mm long at anthesis. . . . . 55. *Th. phyllopodus* Klok.
- + All cauline leaves very densely disposed along the flowering branches, imbricated; pedicels ca. 1 mm long; calyx 3.5–4 mm long . . . . . 59. *Th. crebrifolius* Klok.

- 18 (13). Stem covered under the inflorescence with rather long spreading or retrorse hairs; calyx long-haired below, the upper teeth at least sparsely ciliate . . . 19.
- + Stem covered under the inflorescence with short or very short recurved hairs; calyx short-haired below, glabrous or subglabrous above, the upper teeth mostly eciliate, rarely with few cilia . . . . . 26.
19. Leaves on flowering branches relatively large, (6.5) 8–15 (18) mm long, 2.5–6 (7.5) mm broad . . . . . 73. *Th. sibiricus* (Serg.) Klok. et Shost.
- + Leaves on flowering branches smaller . . . . . 20.
20. Leaves mostly obovate to broadly spatulate, rarely oblong-elliptical; cauline leaves 2 pairs up to inflorescence . . . . . 72. *Th. paucifolius* Klok.
- 516 + Leaves elliptical or oblong-elliptical, rarely ovate; cauline leaves more numerous . . . . . 21.
21. Leaves prominently veined beneath (European species) . . . . . 22.
- + Leaves inconspicuously veined (Asian species) . . . . . 23.
22. Leaves on flowering branches 1.5–3.5 mm broad; lower floral leaves elliptical; calyx 4–4.25 mm long at anthesis . . . . . 70. *Th. serpyllum* L.
- + Leaves on flowering branches (1.75) 2–5 (6) mm broad; lower floral leaves broadly elliptical; calyx 4–5 (5.25) mm long at anthesis . . . . . 71. *Th. subarcticus* Klok. et Shost.
- 23 (21). Calyx small, 3.5–3.75 mm long in flower, to 4 mm long in fruit; leaves elliptical or rarely ovate (length/width index 2–3). High-mountain plants of Altai . . . . . 74. *Th. altaicus* Klok. et Shost.
- + Calyx larger, to 4.25–5 mm long in flower; leaves mostly oblong-elliptical. Lowland plants of E. Siberia . . . . . 24.
24. Long trailing sterile shoots arising from base of stems; leaves narrowly oblong-elliptical (length/width index 2.7–7.3), with few cilia confined to lower one-third of the margin . . . . . 75. *Th. mongolicus* Klok.
- + No sterile shoots from base of stems; leaves broader (length/width index to 4.6), with more numerous cilia extending in many leaves halfway up the leaf margin . . . . . 25.
25. Flowering branches 5–10 cm long; cauline leaves (except the lowermost) with rather indistinct petiole; inflorescence oblong-capitate, with 1–2 distant whorls; calyx (4) 4.5–5 mm long . . . 77. *Th. iljinii* Klok. et Shost.
- + Flowering stems 2–5 cm long; all cauline leaves distinctly petiolate; inflorescence capitate; calyx 3.75–4.5 mm long . . 76. *Th. oxyodontus* Klok.
- 26 (13). Leaves small, 3–7 mm long, 1–2.5 mm broad, with 2 pairs of lateral veins; flowering branches 2–4 cm long, with 2–3 pairs of leaves up to inflorescence . . . . . 81. *Th. diminutus* Klok.
- + Leaves larger, with more numerous lateral veins; flowering branches longer and with more leaves . . . . . 27.
27. Cauline leaves 6–16 (20) mm long, 3–8.5 mm broad, oval or oblong-ovate, rarely elliptical . . . . . 79. *Th. bucharicus* Klok.

517	+	Cauline leaves smaller, usually oblong-elliptical . . . . .	28.
28.		Leaves mostly ovate or ovate-elliptical (E. Siberian lowland plants) . . . . .	83. <i>Th. jennisensis</i> Iljin.
	+	Leaves mostly oblong-elliptical (Centr. Asian mountain plants) . . . . .	29.
29.		Calyx 3.5–4 mm long, the upper teeth ciliate . . . . .	82. <i>Th. proximus</i> Serg.
	+	Calyx 4–5 mm long, the upper teeth eciliate . . . . .	30.
30.		Leaves 4–14 mm long, 2–4 mm broad, with 3–4 pairs of lateral veins; flowering branches (2) 4–6 cm long; inflorescence capitate, compact . . . . .	78. <i>Th. seravshanicus</i> Klok.
	+	Leaves 5–10 mm long, 1–3 mm broad, with 2–3 pairs of lateral veins; flowering branches 6–10 cm long; inflorescence loose, on the more vigorous branches with 1–2 distant whorls . . . . .	80. <i>Th. aschurbajevii</i> Klok.
31 (7).		Leaves glabrous . . . . .	32.
	+	At least some of the leaves hairy on both sides . . . . .	36.
32.		Flowering branches covered from inflorescence and nearly to base with long spreading or retrorse hairs; leaves usually ciliate to above the middle (N. Ural) . . . . .	68. <i>Th. hirticaulis</i> Klok.
	+	Flowering branches covered all over with short recurved hairs or only under the inflorescence with longer hairs; leaves not ciliate beyond the middle (other regions) . . . . .	33.
33.		Middle cauline leaves mostly broad-ovate to ovate-triangular . . . . .	67. <i>Th. alatauensis</i> Klok.
	+	Middle cauline leaves oblong-elliptical, rarely broad-elliptical . . . . .	34.
34.		Leaves small, 3–9 mm long and 1–3 mm broad; calyx small, 3.5–3.75 mm long in flower (W. Siberia) . . . . .	66. <i>Th. asiaticus</i> Serg.
	+	Leaves and calyx larger (other regions) . . . . .	35.
35.		Flowering branches to 15 cm long, hairs under inflorescence longer than lower down, spreading or reclinate; inflorescence rather loose, often with a distant whorl (S. Cisurals) . . . . .	65. <i>Th. talievii</i> Klok. et Shost.
	+	Flowering branches to 8 cm long, covered the whole length with short or very short recurved hairs; inflorescence compact (E. Siberia)* . . . . .	69. <i>Th. tonsilis</i> Klok.
518		. . . . .	
36 (31).		Leaves rounded-ovate or ovate-triangular, to 6 mm broad . . . . .	37.
	+	Leaves elliptical or obovate (rarely subovate or oblong-ovate), to 4 mm broad, rarely to 6 mm . . . . .	38.
37.		Flowering branches covered with hairs equaling the stem diameter or twice as large; leaves ciliate only in lower one-third (Far East, S.) . . . . .	60. <i>Th. arsenijevii</i> Klok.
	+	Flowering branches covered with shorter hairs; leaves ciliate all along the margin or at least to the middle (Arctic Siberia) . . . . .	64. <i>Th. reverdattoanus</i> Serg.
38 (36).		Flowering branches 5–11 cm long, covered with rather short spreading hairs; cauline leaves to 14 mm long and 6 mm broad, densely covered with very	

\* cf. *Th. seravshanicus* Klok. which contains forms with elongated lower petioles (see above stage 28).



- short inconspicuous hairs; inflorescence a loose head, with 1–2 distant whorls . . . . . 48. *Th. curtus* Klok.
- + Flowering branches 1–6 cm long, covered with long spreading and short recurved hairs; cauline leaves smaller, densely or sparsely covered with distinct longer hairs; inflorescence a loose head, without distant whorls . . . . . 39.
39. Leaves prominently veined beneath, covered with rather short hairs . . . . . 61. *Th. sokolovii* Klok.
- + Leaves with inconspicuous veins, long-haired . . . . . 40.
40. Flowering branches 2–6 (9) cm long; leaves partly obovate, sparsely hairy or some often glabrous (Anadyr area in the Far East) . . . 62. *Th. diversifolius* Klok.
- + Flowering branches 1–3.5 cm long; leaves elliptical to oval, sometimes subovate, all hairy (lower reaches of River Lena in Arctic Siberia) . . 63. *Th. extremus* Klok.

Series 1. *Praeserpylla* Klok. — Stems terminating in a fertile or assurgent but not flowering shoot; stem covered under the inflorescence with long spreading hairs; leaves short-petioled, relatively broad, hairy; heterophylly not very pronounced; inflorescence capitate, often with a distant whorl; calyx large, 4–5 mm long at anthesis; corolla lilac, with a slender elongated tube.

Far Eastern species. This series seems to occupy an intermediate position between the sections *Euserpyllum* Klok. (series *Inaequales* Klok.) and *Verticillati* Klok. (series *Callierani* Klok. et Shost.).

519 43. *Th. amurensis* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems slender, curved, branched at base, terminating in an assurgent but not flowering shoot; flowering branches erect or assurgent at base, 6–20 cm long, with more or less elongated internodes, densely covered all the way up with long spreading or subpatent hairs; leaves short-petioled, mostly oblong-elliptical, often denticulate, rather densely hairy on both sides, the hairs long in lower part, becoming shorter toward apex; lateral veins 2–3 pairs, slender but prominent; glands rather indistinct; basal leaves crowded at the base of branches, at least 3–5 mm long, 1.25–1.5 mm broad, often ovate, the petiole to one-third the length of the whole leaf; cauline leaves 5–15 mm long, 1.5–4.5 mm broad, with length/width index 2.5–4, at least the middle ones markedly shorter than internodes; lower cauline leaves more obtuse at apex, with petiole to one-quarter length of the whole leaf, the upper with less obtuse apex and rather indistinct petiole; inflorescence capitate, often with a distant whorl; pedicels always shorter than calyx, densely hairy; calyx narrowly campanulate, 3.75–5 mm long, hairy all round, greenish below, dark lilac above, the upper teeth lanceolate, long-ciliate, corolla nearly twice length of calyx, rose-lilac (strongly fading in drying or naturally rather pale). June–July. (Plate XXIX, Figure 1.)

Stony slopes. — Far East: Ze.-Bu. **Gen. distr.:** China (apparently occurring in the N. regions of Manchuria). Described from the shores of River Amur. Type in Leningrad.

44. *Th. ussuriensis* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems rather slender, creeping, terminating in a fertile shoot; flowering branches assurgent at base or erect, 3–5 cm long, with short internodes, with dense, patent hairs, the hairs about equaling stem diameter also in lower part of branch, all dark lilac; leaves mostly ovate, broadest below the middle, short-petioled, 2–12 mm long, 1–6 mm broad, long-haired on both sides, almost villous; lateral veins 3 pairs, slightly prominent; glands sparse and scarcely discernible; lower cauline leaves with petiole to one-third length of whole leaf; middle leaves nearly twice as long as internodes; 520 calyx narrowly campanulate, 4–5 mm long, hairy all round, dark lilac above, the upper teeth lanceolate, subobtusate, long-ciliate; corolla one-and-a-half times as long as calyx, very bright rose-lilac. June–August.

Stony slopes, rocks. — Far East: Uss. Probably endemic. Described from the banks of River Svetlaya. Type in Leningrad.

45. *Th. ochotensis* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems slender, more or less curved, terminating in a fertile shoot; flowering branches 5–7 cm long, rather densely covered with recurved or retrorse hairs, the hairs under the inflorescence equaling stem diameter, those lower down much shorter; leaves short-petioled, elliptical or oval, not denticulate, with sparse or rather dense short hairs on both sides, the margin ciliate to less than halfway toward apex; lateral veins 2–3 pairs, slender, prominent; glands scattered but rather distinct; cauline leaves 4–6 pairs, 4–9 mm long, 2–4.5 mm broad, the lower often rounded-oval, with petiole half the length of blade; inflorescence capitate, sometimes with a distant whorl; pedicels to 4 mm long, short-haired; calyx narrowly campanulate, 4–4.5 mm long, greenish, hairy in lower part, glabrous above, the upper teeth lanceolate, ciliate; corolla nearly twice as long as calyx, rose-lilac. July–August.

Stony slopes. — Far East: Okhot. Endemic. Described from the area between Okhotsk and Aldan. Type in Leningrad.

Note. Only old collections are available; new material is needed.

46. *Th. flexilis* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems slender, irregularly branched; flowering branches assurgent, 4–15 cm long, slender, curved, hairy in upper part, the hairs long, spreading, nearly twice length of stem diameter and more numerous, in lower part short recurved; leaves oblong-elliptical or elliptical, distinctly petiolate, 4–10 mm long, 1.5–4 mm broad, ciliate except at the very apex, long-haired on both sides; lateral veins scarcely visible; glands rather indistinct; middle leaves on flowering branches much shorter than internodes, the lower ones with petiole nearly half length of blade; leaves of sterile shoots also relatively long-petioled; inflorescence capitate, often with a strongly depauperate dis- 521 tant whorl; calyx narrowly campanulate, 3–4.5 mm long, greenish, hairy all round, much more sparsely above, the upper teeth lanceolate, pale lilac. July–August.

Stony tundra. — Arctic: An. (N.). Endemic. Described from River Anadyr. Type in Leningrad.

Series 2. *Inaequales* Klok. — Stems terminating in a sterile shoot; flowering branches relatively long (5–15 cm); leaves rather large, to 14–16 mm long and to 4–7 mm broad, often denticulate, glabrous or sometimes with short hairs but not long-haired; inflorescence finally oblong, often with a distant whorl; calyx large, 4–5.5 mm long at anthesis.

Far Eastern, mostly Ussuri species, growing on stony outcrops, more rarely on sands. They show a certain resemblance to species of the section *Verticillati* Klok.

47. *Th. chankoanus* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub, with long creeping stems terminating in a sterile shoot; flowering branches 5–10 cm long, lilac, densely hairy under the inflorescence, the hairs spreading or retrorse, becoming shorter and sparser toward the base of branches; leaves mostly elliptical or oblong-elliptical, distinctly petiolate, 2–14 mm long, 1–5 mm broad, ciliate in lower third, glabrous or with short hairs at base above; lateral veins distinct, slightly prominent; glands distinct; basal leaves small, rhomboid, with petiole one-quarter to one-third length of leaf; uppermost and floral leaves elliptical-rhomboid, slightly but distinctly denticulate; inflorescence capitate, at first oblong, sometimes branched; pedicels short-haired; calyx narrowly campanulate, 4.5–5 mm long, hairy below, glabrous above; upper teeth lanceolate, with slightly spreading tips, with few short setae but not long-ciliate; corolla large, rose-lilac. June–August.

Coastal sands. — Far East: Uss. (S.). Probably endemic. Described from the shores of Lake Khanka. Type in Leningrad.

Note. Occurring together with *Th. przewalskii* Kom. and hybridizing with it even though it is not phylogenetically related to it.

522 48. *Th. curtus* Klok. in Bot. mat. gerb. BIN AN SSSR, XVI (1954).

Subshrub; stems rather slender, terminating in a trailing sterile shoot; flowering branches divaricate, dark lilac, 5–11 cm long, hairy all along, the hairs rather short throughout, spreading or slightly retrorse, the larger branches with up to 4 flowering branchlets below the middle; leaves mostly oblong-elliptical, rarely elliptical or oval, petiolate, entire, short-ciliate in lower third or slightly higher up, rather densely covered with short or very short hairs, more conspicuously on the veins beneath; lateral veins 3, rarely 2 or 4 pairs, thickish but not very prominent; glands numerous, very distinct; basal leaves to 4 mm long, short-petioled, mostly deciduous; cauline leaves 7–14 mm long, 1.5–6 mm broad, the lowermost oval, with petiole approaching length of blade; inflorescence capitate, rather loose, often with 1 or 2 distant whorls; pedicels mostly 2–3 mm long, short-haired; calyx tubular-campanulate, 4.5–5 mm long, hairy all over, the upper lip glabrous, dark lilac; upper teeth lanceolate, ciliate; corolla 7 mm long, with long slender tube, rose-lilac. July–August.

Stony slopes. — Far East: Ze.-Bu., Uss., Uda. Gen. distr.: China (probably occurring in N. Manchuria). Described from the banks of River Amur (the village Em on the Amur). Type in Leningrad.



49. *Th. nervulosus* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems slender, terminating in an ascending sterile shoot; flowering branches ascending at base or erect, 8–16 cm long, slender, covered under the inflorescence with recurved hairs shorter than stem diameter, toward base also with short subappressed retrorse hairs, sparsely leafy; leaves short-petioled, mostly elliptical, ciliate in lower third, glabrous; lateral veins 2–3 (4) pairs, rather thin but very prominent beneath, distinct above; glands very distinct; small basal leaves mostly shed by flowering time, ca. 2 mm long; cauline leaves 5–16 mm long, 2–7 mm broad, often slightly denticulate, the lowermost often broadly elliptical, with petiole half the length to nearly the length of blade, the middle much longer than internodes; terminal leaves obscurely 523 puberulent; inflorescence capitate, finally oblong, often with a depauperate distant whorl; pedicels to 5 mm long, rather sparsely covered with short hairs; calyx narrowly campanulate, 4–5.5 mm long, green or lilac, hairy below, sparsely pubescent above and glabrous under the teeth, the tube very prominently nerved, the upper teeth lanceolate, acuminate, the margin beset with short cilia and setae; corolla ca. 7 mm long, rose-lilac, with a long narrow tube; nutlets short-ellipsoid to subglobose, 0.6–0.8 mm in diameter, blackish-brown. July–August.

Stony slopes and rocks. — Far East: Uss. Gen. distr.: China (N. Manchuria). Described from the upper reaches of Srednyaya Botcha. Type in Leningrad.

50. *Th. inaequalis* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems slender, strongly curved, terminating in an assurgent sterile shoot and bearing trailing sterile shoots; flowering branches 7–15 cm long, covered under the inflorescence with long retrorse hairs, lower down with short recurved hairs; leaves oblong-elliptical or the upper oblong-ovate, 3–14 mm long, 1–4 mm broad, with length/width index 3–6, gradually narrowed toward base, indistinctly petiolate, the upper with more pronounced petiole, inequilateral, distinctly denticulate, with 1–2 denticulations on each margin, ciliate in lower third, the surface glabrous; lateral veins 2 pairs, inconspicuous; glands scattered, small; axillary fascicles or even elongated secondary flowering branchlets often borne in the leaf axils; inflorescence oblong-capitate, loose, with a depauperate distant whorl; pedicels to 5–6 mm long, often equaling or even exceeding the calyx; calyx tubular-campanulate, 4.5–5.5 mm long, green, glabrous above, the upper teeth narrowly lanceolate, with short setae at margin or at apex short-ciliate; corolla nearly twice as long as calyx, rose-lilac; nutlets short-ellipsoid, ca. 1 mm long, dark brown. June–August.

Stony slopes and rocks. — E. Siberia: Dau. (S. E.); Far East: Ze.-Bu. (S.), Uss., Uda. Gen. distr.: China (N. Manchuria). Described from Vladimir Bay. Type in Leningrad.

Series 3. *Praebajcalenses* Klok. Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).—

524 Stems terminating in a fertile shoot; leaves short-petioled, oblong-elliptical, small and narrow; inflorescence capitate; calyx 3.5–4.5 mm long, the upper teeth more or less ciliate; corolla lilac.

This series comprises two East Siberian species which closely resemble in habit the species of the series *Eubajcalenses* Klok. but differ markedly in the type of branching.

51. *Th. bituminosus* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems terminating in a fertile shoot; sterile shoots arising from the stems or from the rootstock and then long and rooting; flowering branches 4–12 cm long, often more or less branched, covered all over with spreading hairs not exceeding stem diameter, lilac or dark lilac; leaves narrow, oblong or linear-elliptical, 3–9 mm long, 0.75–2 mm broad, all with a very short but fairly distinct petiole, ciliate to the middle or higher up, hairy on both sides or only above; lateral veins 2 pairs, inconspicuous or scarcely visible; glands rather indistinct; cauline leaves mostly with axillary fascicles, the uppermost often subovate; inflorescence capitate, compact; floral leaves 1.5–2.5 mm broad, green; pedicels ca. 1.5–2 mm long, short-haired; calyx narrowly campanulate, 4–4.5 mm long, hairy in lower part and on the sides, glabrous above, lilac or dark lilac, the upper teeth acutely triangular or the lateral lanceolate, ciliate; corolla ca. 6 mm long, lilac. All parts with a pleasant resinous scent. July–August.

Stony steppes and steppose pine woods. — E. Siberia: Ang.-Say. (E.), Lena-Kol. (S.). Dau. Probably endemic. Described from the W. shore of Lake Baikal. Type in Lenin-grad.

52. *Th. minussinensis* Serg. in Animadv. Syst. ex Herb. Univ. Tomsk. 6–7 (1936) 5 and in Kryl. Fl. Zap. Sib. IX (1937) 2391. — *Th. serpyllum* var. *stepposus* Serg. op. cit., 1–2 (1936).

Subshrub; stems slender, terminating in assurgent fertile shoot; flowering branches 2–5 cm long, covered all along with very short recurved hairs, lilac or dark lilac; leaves petiolate, mostly narrowly oblong-elliptical, rarely oblong-obovate or ovate, long-ciliate in lower third or sometimes higher up, the surface glabrous; lateral veins 2–3 pairs, 525 scarcely prominent and rather indistinct; glands small, more numerous and more conspicuous on the upper surface; basal leaves 2–3.5 mm long, 0.5–1 mm broad; cauline leaves 4–7 mm long, 0.75–1.75 mm broad, cuneate at base, the petiole of lower leaves about half the length of blade; inflorescence capitate, often with a depauperate distant whorl; pedicels shorter than calyx, to 2 mm long at anthesis, short-haired; calyx narrowly campanulate, 3.5–4 mm long, hairy below, short-haired above and glabrous under the teeth; upper teeth lanceolate or sharply triangular, rather short, the margin beset with short setae and few short cilia; corolla 5–6 mm long, rose-lilac. Fl. June–July.

Stony and meadow steppes. — W. Siberia: Irt. (S.); E. Siberia: Ang.-Say. (W.). Endemic. Described from Minusinsk district. Type in Tomsk.

Series 4. *Eubajcalenses* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954). — Stems terminating in a sterile shoot; flowering branches densely covered

under the inflorescence and below with long or relatively short, usually spreading hairs; leaves hairy on both sides, the lower cauline slightly differing in shape from the upper, the petiole not more than half length of blade; inflorescence capitate; calyx hairy, the upper teeth profusely ciliate.

This series consists of mountainous species of Dauria (Cisbaikalia) and Altai; it differs from other related series in the strongly developed indument.

53. *Th. eravinensis* Serg. in Animadv. Syst. ex Herb. Univ. Tomsk. 1–2 (1953) 9–10.

Subshrub, forming dense compact flat mats 20–70 cm in diameter; stems rather slender, terminating in a sterile prostrate shoot and bearing rather numerous lateral shoots; flowering branches 1.5–2.5 cm long, covered with short recurved hairs, dark lilac, densely leafy (as are the sterile shoots); cauline leaves linear-oblong and oblong-elliptical, 2–5 mm long, 0.5–1.5 (2) mm broad, cuneate at base, long-ciliate to above the middle, glabrous beneath, long-haired above, the petiole very short, longer in lower leaves; lateral veins quite indiscernible; inflorescence capitate; pedicels ca. 2 mm long, covered with short recurved hairs; calyx tubular-campanulate, 3–4 mm long, lilac-colored, long-haired below, subglabrous above; upper teeth lanceolate, long-acuminate, relatively short, sparsely ciliate; corolla ca. 5 mm long, rather dull; nutlets subglobose, 0.5–0.75 mm long, dark brown. June–July.

Sandy shores of lakes. — E. Siberia: Dau. (Buryato-Mongolia, Eravin lakes). Endemic. Described from the shores of Lake Sosnovo, near Sosnovo-Ozerskoe village. Type in Tomsk; cotype in Leningrad.

54. *Th. eubajcalensis* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub, densely cespitose; stems terminating in a somewhat ascending sterile shoot; flowering branches ca. 4–5 cm long, densely covered with short and few longer horizontally spreading or slightly retrorse hairs, dark lilac; leaves oblong-elliptical to broadly elliptical or oval, cuneate at base, with short or fairly short petiole, 2.5–9.5 mm long, 1–3.5 mm broad, ciliate nearly to the middle, with rather dense short hairs on both sides; lateral veins 2 or 3 pairs, rather thick and very prominent on lower side (though finally attenuate and not reaching the margin); glands more numerous and more distinct on upper surface; basal leaves small, crowded at the base of branches; lower cauline leaves with petiole half the length of the broadly elliptical or oval blade; upper leaves larger; inflorescence capitate; pedicels 1–2 mm long, short-haired; calyx narrowly campanulate, 4–4.5 mm long, lilac, hairy below, short-haired above; upper teeth lanceolate, ciliate; corolla ca. 6 mm long, dark lilac. July–August.

Stony slopes. — E. Siberia: Dau. (Baikal Lake islands). Endemic. Described from Bol'shoy Ushkaniy Island, Baikal. Type in Leningrad.

55. *Th. phyllopodus* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub, rather densely cespitose or almost pulvinate; stems slender, branching, most of the main ramifications terminating in a fertile shoot, some terminating in a



sterile shoot and devoid of flowering branches; terminal sterile shoots obliquely ascending, to 5–7 cm long; flowering branches 2–8 cm long, slender, covered under the inflorescence and all along with short horizontally spreading or rarely recurved hairs, lilac; leaves oblong-elliptical to oblong-obovate, 3–10 mm long, 1–3 mm broad, cuneate at base, gradually tapering to petiole, ciliate to the middle or sometimes above, 527 sparsely covered with rather long hairs; lateral veins 2 or 3 pairs, rather indistinct; glands scattered; small basal and lowermost cauline leaves more or less crowded at the base of branches, short-petioled; other leaves with petiole only slightly shorter than the broader elliptical blade; terminal floral leaves sessile; inflorescence capitate, often with a depauperate distant whorl; pedicels 2–4 mm long, short-haired (the hairs spreading or recurved as on the stem); calyx narrowly campanulate, 4–5.5 mm long at anthesis, hairy below, glabrous or sparingly hairy above, dark lilac; upper teeth lanceolate, 1–1.5 mm long, point-tipped, ciliate; corolla 6–8 mm long, white. All plant parts lemon-scented. July–August.

Mountain slopes. — E. Siberia: Dau. Endemic. Described from the E. shore of Lake Baikal (Chivyrkuiskie bald mountains). Type in Leningrad.

Note. A mountain species, showing a certain affinity to the Arctic *Th. extremus* Klok. It has been collected at different altitudes and it has been observed that the high-mountain form differs from the form of lower altitudes (adopted as type) both in the squat, compact growth and in the recurved hairs on stem and pedicels. It is possible that it constitutes a distinct race. It is necessary to ascertain the color of corolla, which is apparently white in herbarium specimens, but it is not clear to what extent this color is typical of the species.

56. *Th. crenulatus* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems to 2 mm in diameter, branching, the main ramifications terminating in a sterile shoot; lateral shoots arising from stems and from rootstock to 8 cm long, with axillary fascicles; flowering branches 3–7 cm long, densely covered under the inflorescence with horizontally spreading or somewhat retrorse hairs equaling stem diameter, in lower part with shorter retrorse or recurved hairs; leaves elliptical or oblong-elliptical, cuneate at base, narrowed to a short or very short petiole, 2–10 mm long, 0.75–4 mm broad, usually with 1–2 distinct crenulations on each margin, ciliate to  $\frac{1}{3}$  –  $\frac{2}{5}$ , the surface grayish with short hairs; lateral veins 2 or 3 pairs, slightly prominent or rather indistinct; glands rather indistinct; basal leaves small, sessile; cauline leaves usually with axillary fascicles; inflorescence capitate; floral leaves sessile, green; 528 pedicels to 2 mm long, with very short hairs; calyx tubular-campanulate, ca. 4 mm long, hairy all round; upper teeth ciliate, the middle sharply triangular, the lateral teeth lanceolate; corolla ca. 7 mm long, rose-lilac. July–August.

Stony slopes. — E. Siberia: Dau. Endemic. Described from Upper Angara basin (village Verkhne-Angarsk). Type in Leningrad.

57. *Th. narymensis* Serg. in Animadv. Syst. ex Herb. Univ. Tomsk. 6–7 (1936) 4 and in Kryl. Fl. Zap. Sib. IX (1937) 2389. — *Th. serpyllum* var. *hispidus* Serg. op. cit. 1–2 (1936) 6–7.

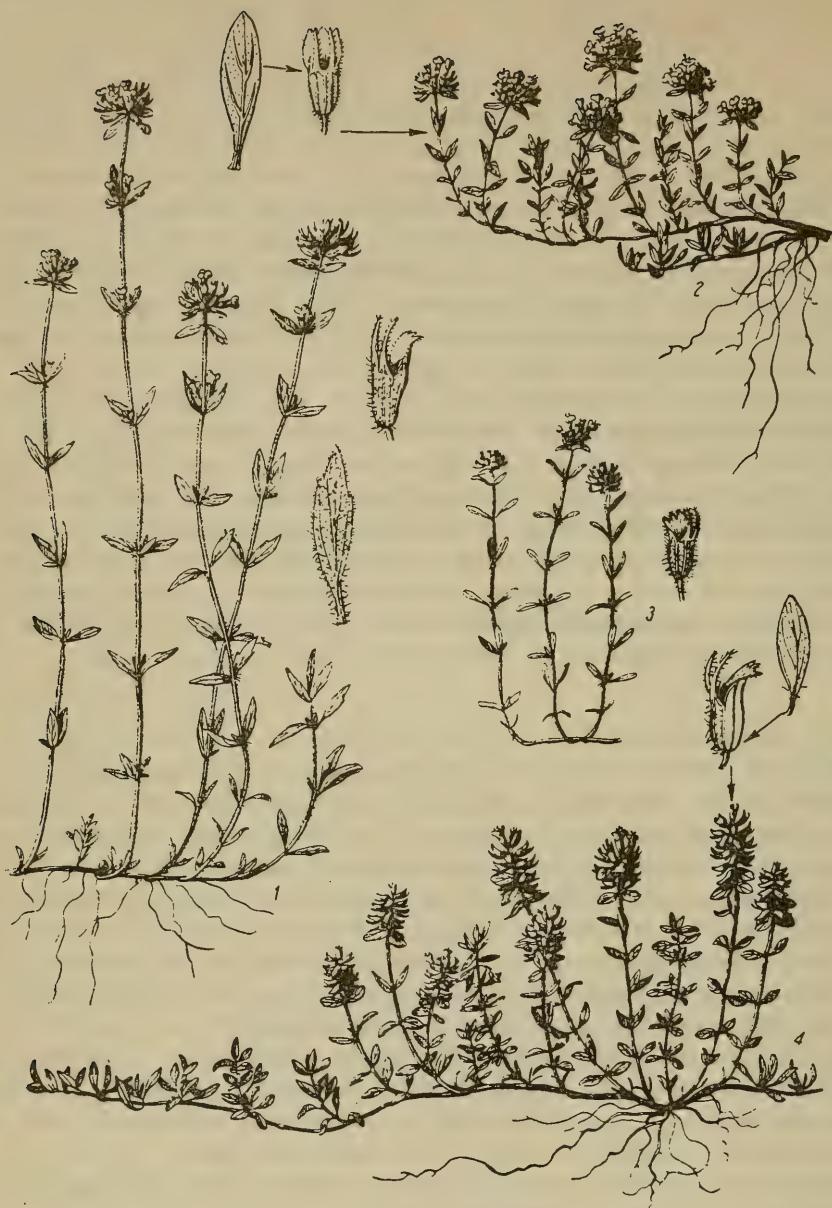


PLATE XXIX. 1 - *Thymus amurensis* Klok., plant fragment, leaf, calyx; 2 - *Th. seravschanicus* Klok., plant fragment, leaf, calyx; 3 - *Th. serpyllum* L., branchlet and calyx; 4 - *Th. subarcticus* Klok. et Shost., general aspect, calyx, leaf.

Subshrub; stems stout, 2–4 mm in diameter, strongly branched, terminating in a sterile shoot; flowering branches 2.5–3 cm long, sparsely covered under the inflorescence with rather short recurved hairs; cauline leaves petiolate, elliptical, ovate or oblong-obovate, 4–8 (10) mm long, 1.5–3 mm broad, with petiole 1–3 mm long, ciliate, long-haired on both sides; inflorescence capitate; calyx 3 mm long, lilac, hairy all round; upper teeth ciliate; corolla rose-lilac, ca. 5 mm long. July–August.

Stony taluses in the alpine mountain zone. — W. Siberia: Alt. (W.). Endemic. Described from Narynskii Range. Type in Tomsk.

58. *Th. schischkinii* Serg. in Animadv. Syst. ex Herb. Univ. Tomsk. 6–7 (1936) and in Kryl. Fl. Zap. Sib. IX (1937) 2389.

Subshrub; stems long, slender, terminating in a sterile shoot; flowering branches 2–5.5 cm long, rather densely covered with horizontally spreading or recurved long hairs; leaves petiolate, ovate, 7–12 mm long, 2–4 mm broad, densely covered with long spreading hairs; inflorescence capitate; calyx 4 mm long, hairy all round; upper teeth ciliate; corolla rose-lilac, 5–7 mm long. July–August.

Stony taluses and moraines in mountains. — W. Siberia: Alt. Endemic. Described from Altai. Type in Tomsk.

59. *Th. crebrifolius* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

531 Subshrub; stems stoutish to stout (to 4 mm in diameter), terminating in a sterile shoot to 6 cm long; flowering branches 1.5–4 cm long, very densely leafy, covered under the inflorescence and below with longer spreading to somewhat retrorse hairs scarcely exceeding stem diameter and shorter patent hairs, dark lilac-brown; leaves distinctly petiolate, oblong-elliptical, long-ciliate, covered on both sides with long and very short hairs, firm and rather stiff; lateral veins 2 pairs, slightly prominent or rather indistinct; glands scattered, rather indistinct; basal leaves short-petioled, 2–4 mm long, 0.75–1 mm broad; cauline leaves 4.5–11 mm long, 1.25–2.25 mm broad, the lower with petiole often more than half length of blade but always shorter than the whole blade, the middle 2–3 times as long as internodes, imbricated; leaves of sterile shoots somewhat oblique; most leaves with axillary fascicles; inflorescence capitate, compact; lower floral leaves ovate-lanceolate, subobtus; pedicels very short (ca. 1 mm) densely covered with short spreading hairs; calyx narrowly campanulate, 3.5–4 mm long at anthesis, short-haired all round, the upper teeth ciliate; corolla 5–6 mm long, rather bright lilac; whole plant strongly lemon-scented. July–August.

Rocks. — W. Siberia: Irt. (S.). Endemic. Described from Ulutau Mts. Type in Leningrad.

Series 5. *Diversifolii* Klok. — It differs from the series *Asiatici* Klok. in rounded leaves, hairy on both sides; from *Eubajcalenses* Klok. in occurrence of heterophylly and leaf shape.

The series is composed of Siberian, Arctic and Far Eastern species.



60. *Th. arsenijevii* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems slender, curved, terminating in an ascending sterile shoot and bearing lateral sterile shoots; flowering branches 5–7 cm long, villous all along, the hairs equaling twice stem diameter, spreading or retrorse; cauline leaves 4–6 pairs, broad-ovate or rounded-triangular, distinctly petiolate, 4–11 mm long, 2.5–6 mm broad, the blade more or less rounded at base, clearly distinct from the petiole, ciliate in lower  
532 third, hairy on both sides, the lower petioles only slightly shorter than blade, the upper one-third to one-half length of blade; lateral veins 3 (4) pairs, slender, slightly prominent; glands rather indistinct; inflorescence capitate; pedicels to 3 mm long, densely hairy; calyx campanulate, 3.75–4.75 mm long, hairy all round, lilac or blackish-lilac above, the upper teeth lanceolate or broadly lanceolate, acute, long-ciliate; corolla small, rose-lilac. July–August.

Stony slopes. — Far East: Uss. Probably endemic. Described from seaside in the Olga Bay area, using the collections of V. K. Arsen'ev. Type in Leningrad.

61. *Th. sokolovii* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems slender, terminating in a sterile shoot; flowering branches only 1–2 cm long, lilac, rather densely hairy, the hairs approximately length of stem diameter or slightly shorter, spreading or retrorse; leaves short-petioled, mostly elliptical, 2–8 mm long, 0.75–4 mm broad, entire, rarely somewhat denticulate, densely short-haired on both sides; lateral veins 2 or 3 pairs, rather thick and prominent beneath; glands scattered, rather indistinct; basal leaves persistent, small, short-petioled; lower cauline leaves with petiole one-third to one-half of total leaf length; floral leaves larger than cauline; inflorescence capitate; pedicels to 2 mm long, short-haired; calyx 4–5 mm long, dark lilac above, the upper teeth lanceolate, ciliate; corolla approximately one-and-a-half times as long as calyx, rose-lilac. July–August.

Stony slopes. — Far East: Okh. Endemic. Described from the banks of River Dzhul'kakit. Type in Leningrad.

62. *Th. diversifolius* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems slender, curved, creeping, terminating in a prostrate or ascending sterile shoot; flowering branches 2–6 (9) cm long, lilac, covered all along with shortish or short recurved hairs; leaves petiolate, rather variable in shape, entire, ciliate up to the middle or beyond, at least some with scattered hairs; lateral veins 3, rarely 2 or 4 pairs, slender, slightly prominent; glands scattered; basal leaves crowded at the base  
533 of branches, elliptical, short-petioled, 2–5 mm long, 1–2 mm broad; cauline leaves 3 pairs, elliptical, narrowed to a rather long petiole, 4 (6)–12 mm long, (1.5) 2–4 (6) mm broad, the lower as long as or much longer than petiole; leaves subtending the inflorescence larger than others but with a short petiole; upper leaves of terminal sterile shoot also relatively large; inflorescence capitate; floral leaves elliptical-rhombic, short-petioled and (the upper) sessile, more or less intensely lilac-tinged; pedicels 1.5–2 mm long, whitish with copious short recurved hairs; calyx narrowly campanulate, 4–5 mm long, greenish or lilac below, hairy, dark lilac above, the upper lip glabrous outside, the upper teeth lanceolate or narrowly lanceolate, with spreading slender

tips, long-ciliate; corolla twice as long as calyx, rose-lilac, with elongated but fairly broad tube. July—August.

Stony placers, coastal sands, tundras. — Arctic: An. Endemic. Described from the banks of River Belaya. Type in Leningrad.

63. *Th. extremus* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub, densely cespitose; stems slender, terminating in a decumbent or obliquely ascending sterile shoot; flowering branches ascending, 1–3.5 cm long, covered with longish and short recurved hairs; leaves elliptical to oval or oval-rhombic, rarely sub-ovate or oblong-ovate, 3–11 mm long, 1–4 mm broad, cuneate at base, narrowed to a rather long petiole, long-ciliate more than halfway or nearly up to apex, with sparse or diffuse long hairs; lateral veins 3 pairs, more or less prominent; glands scattered, rather indistinct; lower cauline leaves with longer petiole often exceeding the blade, rarely short-petioled; floral leaves sessile, obovate or oblong-obovate, mostly green; inflorescence capitate; pedicels to 4 mm long, short-haired; calyx narrowly campanulate, 4–4.5 mm long, lilac or dark purple, hairy below, subglabrous above, the upper teeth sharply triangular, ciliate; corolla ca. 7 mm long, lilac. July—August.

Stony tundra. — Arctic: Arc. Sib. (lower reaches of Lena); E. Siberia: Lena-Kol. (extreme N.). Endemic. Described from the lower reaches of River Lena (Tiksi Bay area). Type in Leningrad.

64. *Th. reverdattoanus* Serg. in Animadv. Syst. ex Herb. Univ. Tomsk. 1–2 (1936) 5 and in Kryl. Fl. Zap. Sib. IX (1937) 2388.

534 Subshrub; stems slender, terminating in a sterile shoot; flowering branches 1.5–5 (6) cm long, covered under the inflorescence with rather short spreading hairs; leaves petiolate, broad-ovate to orbicular or rarely ovate-triangular, 3–10 (11) mm long (including petiole), 1–6 mm broad, long-ciliate to apex or at least to the middle, with scattered long hairs on both sides; lateral veins 2 or more often 3 pairs, slightly prominent; glands very small, scarcely visible; middle leaves on fertile and sterile shoots with petiole as long or nearly as long as blade (to 4 mm long); terminal leaves short-petioled, ovate-elliptical, lilac, more or less concealing the inflorescence; inflorescence capitate, few-flowered but compact; pedicels much shorter than calyx, covered with short spreading hairs; calyx campanulate, (3) 3.5–4 mm long, hairy below, glabrous above, dark lilac, the upper teeth lanceolate, ciliate; corolla intensely rose-lilac, ca. 6 mm long; nutlets subglobose, to 0.75 mm in diameter. July—August.

Sandy slopes, rocks. — Arctic: Arc. Sib. (Ob estuary and lower reaches of Yenisei). Endemic. Described from the Ob estuary. Type in Tomsk.

Note. In the authentic description, the indument is said to consist of long spreading hairs. In the specimens that we have examined, the hairs are indeed spreading but short, much shorter than stem diameter; in other characters they fully conform with the description.

Series 6. *Asiatici* Klok. — Differing from the series *Euserpylla* Klok. et Shost. in pronounced heterophylly. Lower cauline leaves more or less rounded, the petiole as long as blade or nearly so.

Mountain-steppe species of Urals and W. Siberia. The species *Th. tonsilis* Klok. has been provisionally included; its mode of growth has not yet been fully determined.

65. *Th. talievii* Klok. et Shost. in Zhurn. Inst. bot. AN USSR, 9/17 (1936) 195 and in Uch. zap. Khar'k. Gos. univ. 14 (1938) 130. — Ic.: Klok. and Shost. op. cit. (1936) Fig. 4.

Subshrub; stems rather stout, terminating in an obliquely ascending sterile shoot; flowering branches assurgent or ascending, to 15 cm long, branched, hairy under the inflorescence, the hairs shorter than stem diameter, spreading-retrorse; leaves petiolate, mostly broad-elliptical, 6 (7)—13 (15) mm long, (2) 3—4.5 mm broad, sometimes slightly 535 denticulate, ciliate in lower half, with prominent lateral veins and scattered glands; lower cauline leaves rounded-rhomboid, the petiole nearly as long as blade; inflorescence capitate, often with a distant whorl; pedicels shorter than or as long as calyx, short-haired; calyx narrowly capitate, 4.25—4.5 mm long in flower, to 5 mm in fruit, hairy all round, the upper teeth sharply triangular, ciliate; corolla one-and-a-half times as long as calyx, lilac; nutlets ellipsoid, ca. 0.8 mm long. June—July.

Stony slopes, taluses and outcrops. — European part: V.-Kama (S. Urals and Cisurals). Endemic. Described from the territory of former Belebееvskii uezd (village Slakh). Type deposited in Khar'kov.

66. *Th. asiaticus* Serg. in Animadv. Syst. ex Herb. Univ. Tomsk. 6—7 (1936) and in Kryl. Fl. Zap. Sib. IX (1937) 2286.

Subshrub; stems slender, 1—2 mm in diameter, terminating in an ascending or assurgent sterile shoot; flowering branches assurgent, 3—7 cm long, uniformly covered all the way up with short recurved hairs; leaves petiolate, ovate or oval to elliptical or oblong-elliptical, 3—9 mm long, 1—3 mm broad, with length/width index 2—4.5, long-ciliate in lower third, the surface glabrous; lateral veins 2 or 3 pairs, rather slender, more or less prominent in upper leaves, often quite indistinct in the lower; glands small but numerous, more or less distinct; lower cauline leaves much smaller than others, with more rounded blade and petiole nearly as long as blade, the upper larger than the middle, short-petioled; inflorescence capitate; floral leaves oblong-ovate, green; pedicels at anthesis much shorter than calyx, densely covered with very short recurved hairs; calyx 3.5—3.75 mm long in flower, hairy below, glabrous above, the upper teeth lanceolate, acuminate, the margin profusely beset with short bristles and few short cilia (these mostly in middle part); corolla ca. 6 mm long, purple-lilac. June—August.

Steppe and stony mountain slopes. — W. Siberia: Ob (S.), Irt., Alt. Endemic. Described from W. Siberia. Type in Tomsk.

Note. We have considerably restricted the scope of this species and correspondingly also its geographic distribution.



67. *Th. alatauensis* (Klok. et Shost.) Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954). — *Th. sibiricus* var. *alatauensis* Klok. et Shost. in Zhurn. Inst. bot. AN USSR, 10/18 (1936) 159.

536 Subshrub; stems rather slender (1–1.5 mm in diameter), terminating in a sterile shoot and bearing elongated trailing shoots; flowering branches assurgent, hairy under the inflorescence, the hairs about equaling stem diameter, recurved, becoming shorter and sparser toward base of branch; leaves mostly broad-ovate to ovate-triangular, all distinctly petiolate, in lower half or sometimes only to base with few cilia to 1 mm long; lateral veins 3 or 4 pairs, slightly prominent, slender; glands small, scattered; basal leaves usually oblong-ovate, short-petioled, 3–4 mm long, 1–1.5 mm broad, with 2 pairs of rather indistinct veins; cauline leaves 5–14 mm long, 2.5–8 mm broad, the lower with petiole about equaling blade; inflorescence capitate, often branched (the upper leaves with up to 4 flowering axillary branches); pedicels 1.5–4 mm long, whitish with numerous retrorse-appressed hairs; calyx narrowly campanulate, 4–4.5 mm long, short-haired in lower part, glabrous above; upper teeth narrowly lanceolate, elongate, the margin with short setae and few cilia; corolla 6–7 mm long, rather dull lilac; nutlets short-ellipsoid, ca. 0.8 mm long, blackish-brown. June–August.

Rocks, stony slopes, sometimes in pine woods, on sands. — W. Siberia: Ob (S. E.), Alt. (Kuznetskii Alatau). Described from Kuznetskii Alatau. Type in Leningrad.

68. *Th. hirticaulis* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems rather stout, terminating in an ascending sterile shoot; flowering branches 5–8 cm long, covered under the inflorescence and nearly to base with rather long spreading or retrorse hairs; sterile shoots with similar indument; leaves 3.5–15 mm long, 1–4.5 mm broad, slightly longer on sterile than on fertile shoots; lowermost cauline leaves reduced, oblong-elliptical, short-petioled; middle leaves ranging from broad-elliptical with petiole equaling blade (the lower) to elliptical, short-petioled, ciliate to the middle or beyond; veins 3 or 4 pairs, distinct but not prominent, rather slender; floral leaves oblong-ovate, sessile, green, with 2 pairs of lateral veins; inflorescence capitate, often with a distant whorl; calyx 4–5 mm long, lilac, hairy all round, densely so below; upper teeth ciliate; corolla large, lilac. July–August.

Limestone outcrops. — European part: N. Urals. Endemic. Described from the basin of River Usa (Chernyshev Ridge, Azak Range). Type in Leningrad.

537 69. *Th. tonsilis* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems rather slender, terminating in a fertile (?) shoot; sterile shoots lateral or arising from the rootstock, to 14 cm long; flowering branches 5–8 cm long, covered under the inflorescence and all along with very short recurved hairs, lilac; leaves variable in shape, short-petioled, 3–12 mm long, 1–6 mm broad, ciliate in lower third or up to the middle, the surface glabrous; lateral veins 3–4 pairs, slightly prominent; glands small, scarcely visible; basal leaves crowded at base of branches, mostly soon deciduous, small, ovate, short-petioled; cauline leaves 7–9 pairs, the lower rounded-rhomboid, narrowed to petiole about as long as blade, the upper elliptical, cuneate at base, gradually narrowed to a short petiole; floral leaves ovate-rhomboid,

narrowed to a very short petiole, green; inflorescence capitate, compact; pedicels to 2 mm long, covered with very short hairs; calyx narrowly campanulate, 4–5 mm long, lilac or dark lilac, hairy below, sparsely hairy above, glabrous under the teeth; upper teeth narrowly lanceolate, sharp-pointed, short-ciliate (the cilia often confined to the tip); corolla about one-and-a-half times as long as calyx, lilac; nutlets short-ellipsoid, ca. 0.75 mm long, markedly compressed, blackish-brown. All plant parts rather strongly camphor-scented. July–August.

Stony slopes. — E. Siberia: Ang.-Say. Endemic. Described from the basin of Upper Angara (Kiren Mt.). Type in Leningrad.

Series 7. *Euserpylla* Klok. et Shost. in Uch. zap. Khar'k. Gos. univ. 6–7 (1936) and 14 (1938) 128. — Stems terminating in a trailing sterile shoot; covered under the inflorescence with longer and usually spreading hairs; all leaves short-petioled, more or less alike in shape; venation camptodromous; upper calyx-teeth sparsely ciliate; calyx-tube hairy; corolla rather bright lilac.

European-Siberian forest species. In Altai Mountains, ascending to the alpine zone.

70. *Th. serpyllum* L. Sp. pl. ed. 1 (1753) 590; V. Dubanskii in Fedch. and Fler. Fl. Evrop. Ross. 138; Klok. and Shost. in Uch. zap. Khar'k. Gos. univ. 14, 129; Klok. in Vizn. rosl. URSR, 427. — *Th. baicalensis* Serg. in Animadv. Syst. ex Herb. Univ. Toms. 5 (1935) 4. — Exs.: GRF, No. 478.

Subshrub; stems slender, terminating in an always decumbent sterile shoot; flowering 538 branches erect or assurgent, 2–13 cm long, hairy under the inflorescence, the hairs rather long, horizontally spreading or retrorse; leaves petiolate, elliptical or oblong-elliptical, 5–10 (11) mm long, 1.5–3.5 mm broad, long-ciliate to the middle; lateral veins rather thick, prominent on lower side and distinct above; glands rather indistinct; leaves subtending the inflorescence elliptical, with rounded-angular margins; inflorescence capitate, compact; pedicels considerably shorter than calyx, short-haired; calyx narrowly campanulate, 4–4.25 mm long in flower, the tube short-haired; upper teeth more or less ciliate, sometimes only a few cilia at the tip; corolla 6–8 mm long, bright rose-lilac; nutlets short-ellipsoid, ca. 0.6 mm long. Second half of June to August. (Plate XXIX, Figure 3.)

Sands in pine woods. — European part: Kar.-Lap., Lad.-Ilm., Dv.-Pech., Balt., U. Dnp., U. V., V.-Kama, U. Dns., M. Dnp. (isolated location in the Vinnitsa area), V.-Don (N.), Transb. (N.); W. Siberia: Ob, U. Tob. (N.W.); E. Siberia: Dau. **Gen. distr.:** Scand., Atl. and Centr. Eur. Described from S. Sweden. Type in London.

Note. A characteristic plant of the podsol soil zone in the European part of the U. S. S. R. The southern distribution limit in the Ukraine nearly coincides with the boundaries of Polesie; more to the east, in the RSFSR it stretches to the line Karachev-Bolokhov-Dmitrov-Vladimir-Pavlovo-Syzran' area — Chkalov area — Orsk area — Troitsk area. The species has not been reported from Siberia recently, having been replaced by other, previously unknown species. We find, however, that it does occur in the more westerly regions. In the U. S. S. R., *Th. serpyllum* L. forms numerous

hybrids with kindred and even unrelated species, namely: *Th. subarcticus* Klok. et Shost., *Th. ucrainicus* Klok., *Th. mugodzhariensis* Klok. et Shost., *Th. zhegulienensis* Klok. et Shost., *Th. marschallianus* Willd. and probably some additional species. Particularly characteristic and widespread crosses are with *Th. ucrainicus* Klok. (*Th. pollessicus* Klok. sp. hybr.).

71. *Th. subarcticus* Klok. et Shost. in Zhurn. Inst. bot. AN USSR, 9/17 (1936) 194 and in Uch. zap. Khar'k. Gos. univ. 14 (1938) 128. — Ic.: Klok. and Shost. op. cit. (1936) Fig. 3.

Subshrub; stems long, terminating in a prostrate or somewhat ascending shoot; flowering branches assurgent or ascending, 2–6 (8) cm long, covered under the inflorescence with rather long spreading hairs; leaves short-petioled, elliptical, 5–11 mm long, (1.75) 2–5 (6) mm broad, on sterile shoots mostly broad-elliptical, to 15 mm long and 5.5 mm broad, long-ciliate in lower third; leaves subtending inflorescence broadly elliptical, ciliate to the middle; inflorescence capitate, rather loose, at length markedly elongating; calyx campanulate, 4–5 (5.25) mm long in flower, the upper teeth sharply triangular, ciliate; corolla 7–7.5 mm long, dark lilac; nutlets short-ellipsoid, 0.8–0.9 mm long. June–July. (Plate XXIX, Figure 4.)

Coastal sands, calcareous rock outcrops, riverside and seaside rocks. Arctic: Arc. Eur. (S.); European part: Kar.-Lap., Lad.-Ilm. (N.), Dv.-Pech. (N.). Endemic. Described from the S. coast of Kola Peninsula (Stremona village). Type in Leningrad.

72. *Th. paucifolius* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems slender, terminating in a trailing sterile shoot; flowering branches erect or assurgent, 1–8 (10) cm long, covered under the inflorescence with short recurved hairs; basal leaves small, oblong-elliptical, cuneate at base, sessile; cauline leaves 2 pairs, petiolate, mostly obovate, cuneate to spatulate at base, rarely oblong-elliptical, 4–14 mm long, 1–3.5 mm broad, ciliate to the middle or often higher up, with glabrous surface (lower pair) or with scattered hairs (upper cauline pair and lower floral leaves); inflorescence capitate, compact; pedicels much shorter than calyx; calyx 4–5 mm long, lilac-purple, the upper teeth ciliate; corolla relatively large, bright lilac-purple. July–August.

Stony mountain slopes, in forest and high-mountain tundra belts.— European part: V.-Kama (Urals). Endemic. Described from Mt. Denezhkin Kamen'. Type in Leningrad.

73. *Th. sibiricus* (Serg.) Klok. et Shost. in Zhurn. Inst. bot. AN USSR, 10/18 (1936) 159, excl. var. — *Th. serpyllum* var. *sibiricus* Serg. in Animadv. Syst. ex Herb. Univ. Tomsk. 1–2 (1936) 6. — *Th. jensisseensis* Serg. in Kryl. Fl. Zap. Sib. IX (1937) 2388, pro maxima parte, non Iljin.

Subshrub; stems rather slender, terminating in a trailing sterile shoot; flowering branches 4–14 (16) cm long, covered under the inflorescence with longer hairs equaling stem diameter and shorter retrorse or recurved hairs; leaves distinctly petiolate, mostly



elliptical or oblong-elliptical, cuneate at base, obtuse at apex, sparingly ciliate in lower third; inflorescence capitate; calyx tubular-campanulate, ca. 4 mm long; corolla 5–7 mm long, lilac; nutlets subglobose, 0.8 mm in diameter. July–August.

- 540 Rocks. — W. Siberia: Ob (S.), Irt. (E.), Alt. (N.). Endemic. Described from former Biisk uezd (village Topol'noe). Type in Tomsk.

74. *Th. altaicus* Klok. et Shost. in Zhurn. Inst. bot. AN USSR, 10/18 (1936) 159; Serg. in Kryl. Fl. Zap. Sib. IX, 2387. — *Th. altaicus* Serg. in Animadv. Syst. ex Herb. Univ. Tomsk. 6–7 (1936) 2.

Subshrub; stems rather short, terminating in a trailing or ascending sterile shoot; flowering branches ascending, usually 2–5 cm long, covered under the inflorescence with long and short recurved hairs, lilac; leaves elliptical, rarely ovate, cuneate at base, narrowed to a well developed petiole, obtuse, 4–8 (10) mm long, 1.5–3 (3.5) mm broad (length/width index 2–3), ciliate in lower third, the surface glabrous or with scattered hairs (f. *hirsutus* Klok. et Shost.); lateral veins more or less prominent; glands distinct; inflorescence capitate; floral leaves oblong-elliptical, often lilac, ciliate to the middle; pedicels rather short, short-haired; calyx tubular-campanulate, 3.5–3.75 mm long in flower, to 4 mm in fruit, usually lilac, with scattered hairs below and glabrous above or hairy all round (in f. *hirsutus* Klok. et Shost.); upper teeth sharply triangular, ciliate or copiously ciliate (in f. *hirsutus* Klok. et Shost.); corolla lilac-purple, 5–6 mm long; nutlets subglobose, ca. 0.5 mm in diameter, blackish. July–August.

Stony slopes in the alpine zone and in mountain steppes. — W. Siberia: Alt. Endemic. Described from the Altai National Park. Type deposited in Khar'kov; cotype in Leningrad.

75. *Th. mongolicus* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

- Subshrub; stems decumbent or ascending, not rooting, terminating in a decumbent or ascending sterile shoot; creeping sterile shoots also arising directly from the rootstock, to 28 cm long, with upright leaves; flowering shoots 2–10 cm long, suberect or obliquely assurgent, arising from the stems as branches and directly from the rootstock, covered under the inflorescence with retrorse hairs equaling stem diameter; indument in lower part of fertile and sterile shoots composed of fewer and shorter recurved hairs; leaves short-petioled, mostly oblong-elliptical, narrow; basal leaves reduced, elliptical, 541 oblong-ovate or obovate, 2–12 mm long, 0.75–3 mm broad, with length/width index 2.7–7.3, gradually narrowed to petiole (this to 2 mm long in lower leaves), obtusish, sparsely ciliate in lower third, glabrous on the surface; venation camptodromous; lateral veins 2 or 3 pairs, slender, slightly prominent; glands sparse and rather indistinct; inflorescence capitate, often with a depauperate distant whorl; floral leaves oblong-elliptical, sessile; pedicels to 3 mm long, with dense short hairs; calyx 3.75–4.25 mm long in flower, long-haired below; upper teeth triangular-lanceolate, long-ciliate; corolla ca. 7 mm long, lilac. June–July.

Sandy places. — E. Siberia: Dau. (?). Gen. distr.: N. Mong. Described from Mongolia. Type in Kiev.

Note. The geographic distribution of this species on U.S.S.R. territory has not been definitely established.

76. *Th. oxyodontus* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub, densely cespitose; stems slender, terminating in an obliquely ascending sterile shoot; flowering branches 2–5 cm long, covered all round with more or less recurved hairs, the hairs under the inflorescence nearly equaling stem diameter, progressively shorter and sparser toward base, dark lilac; leaves short-petioled, oblong-elliptical, rarely subovate or obovate, 2–9 mm long, 0.75–4 mm broad, ciliate halfway through to apex, the surface glabrous; lateral veins 2 or 3 pairs, slightly prominent or scarcely visible; glands distinct; inflorescence capitate; lower floral leaves elliptical to subrhomboid, lilac, with scattered short hairs; pedicels 1–2.5 mm long, short-haired; calyx narrowly campanulate, 3.75–4.5 mm long, dark lilac, densely hairy below, glabrous above under the teeth; upper teeth lanceolate, subequal, ca. 1 mm long, acute, ciliate; corolla 6–7 mm long, lilac. July–August.

Rocks. — E. Siberia: Lena-Kol. Endemic. Described from Kolyma (cliffs of Tolstoy and Krestovyi capes). Type in Leningrad.

77. *Th. iljinii* Klok. et Shost. in Zhurn. Inst. bot. AN USSR, 10/18 (1936) 160.

Subshrub; stems terminating in an ascending sterile shoot and bearing trailing sterile shoots; flowering branches erect or somewhat ascending, 5–10 cm long, densely covered under the inflorescence and to the middle with rather long spreading or somewhat retrorse and shorter recurved hairs, short-haired at base; leaves with very short petiole, mostly oblong-elliptical, ciliate in lower third or up to the middle, the surface glabrous; lateral veins more or less prominent; glands distinct; basal leaves ca. 3 mm long and 1 mm broad; cauline leaves 6–10.5 (11.5) mm long, 2–3.25 mm broad, on sterile shoots to 13.5 mm long and 4.5 mm broad, the length/width index 2.7–4.6; petioles distinct only in lower leaf pair, ca. 2 mm long; inflorescence oblong-capitate, rather loose, with 1 or 2 distant whorls; pedicels shorter than to nearly as long as calyx, covered with relatively long recurved hairs; calyx tubular-campanulate, (4) 4.5–5 mm long, hairy below, glabrous above; upper teeth lanceolate or sharply triangular, ciliate; corolla ca. 7 mm long, lilac; nutlets subglobose, ca. 1 mm in diameter, brown. June–August.

Coastal sands. — E. Siberia: Ang.-Say. Endemic. Described from Krasnoyarsk area. Type in Khar'kov; cotype in Leningrad.

Note. A species discovered by M. M. Il'in and to this day known only from the classical location.

Series 8. *Seravshanici* Klok. — Stems terminating in a trailing, prostrate or ascending sterile shoot; covered under the inflorescence with short or very short recurved hairs; leaves petiolate, the petiole of lower cauline leaves relatively longer but always shorter than blade; lateral veins slightly prominent; inflorescence capitate, sometimes

with a distant whorl; calyx short-haired below, glabrous or subglabrous above; upper teeth mostly eciliate, rarely with few cilia; corolla rather dull rose-lilac.

This series contains mostly Central Asian high-mountain species. Exceptional in this respect is the riverside *Th. jensseensis* Iljin which may merely display convergent characters. Species of this series differ from those of *Euserpylla* Klok. et Shost. and, even more markedly, from *Asiatici* Klok., mainly in the much scantier indument.

78. *Th. seravshanicus* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XXVI (1954).

Subshrub; stems rather slender, terminating in a prostrate or ascending sterile shoot; flowering branches assurgent or obliquely ascending, (2) 4–6 cm long, covered under the inflorescence with short recurved hairs, more or less lilac; leaves petiolate, very  
543 variable in shape and size but mostly oblong-elliptical, with few short cilia in lower quarter, the surface glabrous; lateral veins 3 or 4 pairs, slender, slightly prominent or rather indistinct; glands scattered but more or less distinct; basal leaves crowded at the base of branches, often soon deciduous, oblong-elliptical, short-petioled, 2–3 mm long, ca. 1 mm broad; cauline leaves 4–14 mm long, 2–4 mm broad, the lower elliptical, with longer petiole (sometimes not much shorter than blade). The upper oblong-elliptical, gradually narrowed to a short petiole, or else the lower broad-ovate to oval and the upper elliptical to rounded-rhomboid; leaves of terminal sterile shoots elliptical or oblong-elliptical, short-petioled, with axillary fascicles, on the average larger than the cauline, to 16 mm long and 5 mm broad; inflorescence capitate, compact; floral leaves ovate or oblong-ovate, broadest below the middle; pedicels 1–3 mm long, short-haired; calyx narrowly campanulate, 4–5 mm long, short-haired below, subglabrous above, lilac, the upper teeth lanceolate, acute, the margin with short setae but eciliate; corolla of hermaphrodite flowers ca. 7 mm long, rose-lilac. June–August. (Plate XXIX, Figure 2.)

Stony mountain slopes, mountain steppes, alpine meadows. — Centr. Asia: Pam.-Al., Syr D., T. Sh. Probably endemic. Described from Zeravshan range. Type in Leningrad.

79. *Th. bucharicus* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems long, strongly lignified, covered with gray bark, 2–3 mm thick, branching; flowering shoots arising from stem ramifications of first order, these terminating in a sterile shoot; lateral sterile shoots arising from stems curved and trailing or obliquely ascending, to 12 cm long; flowering branches assurgent at base or erect, 5–10 cm long, covered under the inflorescence with short recurved hairs, lower down with fewer very short hairs; leaves oval or oblong-ovate, rarely elliptical, 4–16 (20) mm long, 1.5–8.5 mm broad, with length/width index 1.6–3.3, gradually narrowed at base to a very short petiole, the cilia confined to lower third, few, 0.5–0.7 (1) mm long, the surface glabrous; lateral veins 3 or 4 pairs, slender, prominent but only slightly so;  
544 glands rather small, fairly distinct; basal leaves small, to 4 mm long, 1.25–1.5 mm broad; cauline leaves usually 4 pairs, the middle ones on flowering branches much shorter than internodes, on sterile shoots as long as or longer than internodes; inflorescence capitate, sometimes with a strongly depauperate distant whorl; pedicels 2–3 (5) mm long, whitish with dense short pubescence; calyx narrowly campanulate,



4–4.5 (5) mm long, short-haired below, glabrous or subglabrous above, lilac; upper teeth lanceolate, the margin with short setae or additionally short-ciliate; corolla ca. 8 mm long, rose-lilac. June–August.

Mountain slopes up to vegetation limit. — Centr. Asia: Pam.-Al. Endemic. Described from Bal'dzhuan (Polizak Pass). Type in Leningrad.

80. *Th. aschurbajevii* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Perennial; stems rather stout or somewhat slender, terminating in an ascending fertile shoot; sterile shoots arising from stems, more or less prostrate, to 10 cm long; flowering branches assurgent at base, 6–10 cm long, covered under the inflorescence with rather short retrorse hairs, lower down with very short recurved hairs, faintly lilac; leaves oblong-elliptical to elliptical, more rarely oblong-obovate, all with a short but distinct petiole, the margin with few short cilia at base, the surface glabrous; lateral veins 2–3 pairs, slightly prominent but quite distinct; glands scattered, small; basal leaves crowded at base of branches, 3.5–5 mm long, 1.25–1.5 mm broad, with a rather indistinct petiole; cauline leaves 3–4 pairs, 5–10 mm long, 1.5–3 mm broad; lower cauline leaves with somewhat longer petiole than other leaves but less than half length of blade; inflorescence capitate, loose, on more vigorous branches interrupted, with 1 or 2 distant whorls; pedicels 2–4 mm long, densely covered with short recurved hairs; calyx narrowly campanulate, 4–5 mm long, short-haired below, glabrous above, usually green, rarely faintly lilac; upper teeth lanceolate, acute, subequal, the margin with short setae, eciliate; corolla one-and-a-half times as long as calyx, rather dull, rose-lilac, covered outside with scattered short hairs. June–August.

Stony taluses and slopes. — Centr. Asia: Pam.-Al. (Turkestan range, Pamir). Endemic. Described from Pamir (Ak-Baital). Type in Leningrad.

Note. This species was first collected by Yu. Ashurbaev, member of the Kushakevich expedition to Pamir in August 1878. In 1914 it was also found on the N. slope of the Turkestan range, near Tugun-Bulak (tributary of River Sanzar) by A. I. Mikhel'son.

81. *Th. diminutus* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems slender, terminating in a prostrate sterile shoot to 4 cm long; flowering branches ascending, 2–4 cm long, curved, covered under the inflorescence with short spreading hairs, rather sparsely leafy; leaves short-petioled, mostly oblong-elliptical, the margin with rather few cilia to 1 mm long in lower third or somewhat higher up, the surface glabrous; lateral veins 2 pairs, scarcely visible; glands scattered, small, rather indistinct; basal leaves crowded, sessile, 1.75–3 mm long, 0.75–1 mm broad; cauline leaves 2 or 3 pairs, 3–7 mm long, 1–2.5 mm broad, the lowest small, often ovate or obovate, with petiole more than half the length of blade; inflorescence capitate, rather loose, often with a depauperate distant whorl; pedicels 1.5–4 mm long, covered with spreading hairs shorter than on stem; calyx narrowly campanulate, 3.75–4.25 mm long, dark lilac, sparsely hairy below, glabrous or subglabrous above; upper teeth lanceolate, the margin with short setae and few short cilia; corolla 7–8 mm long, bright rose-lilac, with scattered hairs outside. July–August.

Stony taluses of high upland. — Centr. Asia: Pam.-Al. (E. Pamir). **Gen. distr.:** probably occurring in the N. regions of Afghanistan. Described from E. Pamir (Ak-Beik river bed). Type in Leningrad.

**Note.** This species is probably vicarious in relation to *Th. seravschanicus* Klok. of which no specimens have been encountered in Pamir.

82. *Th. proximus* Serg. in *Animadv. Syst. ex Herb. Univ. Tomsk.* 6–7 (1936) 3 and in *Kryl. Fl. Zap. Sib.* IX (1937) 2387.

Subshrub; stems rather slender, 1–1.5 mm in diameter, terminating in a sterile shoot; flowering branches 4–5 cm long, with 3–4 internodes, covered with short recurved hairs; cauline leaves petiolate elliptical or subovate, 10–13 mm long, 3–5 mm broad, with petiole 2–3 mm long, sometimes slightly denticulate, very sparsely ciliate only at base, the surface glabrous; lateral veins 3 pairs, prominent; glands scattered; inflorescence capitate; floral leaves broad-ovate, ciliate in lower third; calyx 3.5–4 mm long, lilac, hairy below, glabrous above; upper teeth with scattered cilia; corolla lilac-rose, 5–6 mm long. July.

Mountain slopes. — W. Siberia: Alt.; Centr. Asia: Dzu.-Tarb. (Tarbagatai). Endemic. Described from Altai. Type in Tomsk.

83. *Th. jenseensis* Iljin in Fedde, *Repert.* XXXIX (1936) 320; Serg. in *Kryl. Fl. Zap. Sib.* IX, 2388, p. p. excl. syn.

Subshrub; stems slender, terminating in a sterile shoot; flowering branches assurgent, 4–11 cm long, covered under the inflorescence with very short recurved to subappressed hairs; basal leaves 2–3.5 mm long, ca. 1 mm broad; cauline leaves mostly ovate or ovate-elliptical, 4–10 mm long, 1.5–5 mm broad, with distinct petiole nearly half length of blade, the margin with rather sparse and rather short cilia; lateral veins 2 or 3 pairs, slender and rather indistinct; glands small, rather indistinct; inflorescence capitate, rather loose, sometimes (on more vigorous branches) with a depauperate distant whorl; pedicels 1.5–5 mm long, densely covered with short recurved hairs; calyx tubular-campanulate, 3.5–4.5 mm long, with rather short sparse hairs below, glabrous above, green or lilac-tinged; nutlets short-ellipsoid, somewhat attenuate at apex and at base, 0.6–0.7 mm long. July–August (first half of September).

Pebbly river banks. — E. Siberia: Ang.-Say. (W.). Endemic. Described from Yenisei (near the village Oznachennaya). Type in Leningrad.

Section 4. **Kotschyani** Klok. — *Grex Kotschyani* Klok. et Shost. in *Uch. zap. Khar'k. Gos. univ.* 6–7 (1936) 289, incl. *grex Suffruticosi* *ibid.* 295 and 14 (1938) 131. — Subshrubs, extensively lignified; stems strongly branched, ascending, terminating in a fertile shoot; trailing sterile shoots wanting (except in the series *Subcollini*); leaves petiolate, ovate or (in series *Suffruticosi*) elliptical, with length/width index 1–3, rarely up to 5; venation camptodromous or (in series *Eukotschyani*) pseudomarginal; stems covered all round with hairs of variable length; inflorescence usually capitate,

rarely elongate or interrupted; upper calyx-teeth acute, with ciliate or eciliate margin; corolla often white or whitish.

Plants of dry stony slopes, ascending high up into the mountains. Mainly composed of Irano-Transcaucasian and N. Kazakhstan species.

- 547 1. Leaf venation pseudomarginal . . . . . 2.
- + 2. Leaf venation usually camptodromous . . . . . 6.
2. Leaves thin, with 2 pairs of lateral veins; corolla lilac (a rare Uralian species) . . . . . 106. **Th. binervulatus** Klok. et Shost.
- + Leaves mostly rather thick, with 3–4 pairs of veins; corolla white or rarely whitish, with pale lilac spots (Transcaucasian species) . . . . . 3.
3. Small plants, with slender flowering branches 3–6 cm long; leaves 4–5 mm long, 2.25–3 mm broad . . . . . 87. **Th. fedtschenkoi** Ronn.
- + Much larger plants; leaves at least twice as long . . . . . 4.
4. Leaves densely hairy on both sides; the whole plant white- or gray-tomentose . . . . . 84. **Th. eriophorus** Ronn.
- + Leaves glabrous or sparsely hairy; plants not white- or gray-tomentose . . . . . 5.
5. Leaves glabrous; inflorescence elongated, interrupted; calyx 3–4 mm long; corolla whitish, with pale lilac spots on both lips . . . . . 86. **Th. migricus** Klok. et Shost.
- + Leaves sparsely hairy; inflorescence capitate; calyx 4–5 mm long; corolla white . . . . . 85. **Th. kotschyanus** Boiss. et Hohen.
- 6 (2). Middle cauline leaves oblong-ovate to ovate-triangular or suborbicular, 3–10 mm broad (all Transcaucasian except one Kopet-Dag species) . . . . . 7.
- + Middle cauline leaves linear-spatulate or oblong-elliptical to broadly elliptical, 1.5–5 mm broad; Volga-Kazakhstan species . . . . . 18.
7. Trailing sterile shoots long; leaves ovate; inflorescence capitate; upper calyx-teeth narrowly lanceolate, long-ciliate . . . . . 98. **Th. grossheimii** Ronn.
- + Trailing sterile shoots wanting or very short . . . . . 8.
8. Flowering branches covered under the inflorescence with short or very short recurved hairs; leaves glabrous (in Transcaucasian species) or short-haired (in the Kopet-Dag species); upper calyx-teeth eciliate . . . . . 9.
- + Flowering branches covered under the inflorescence (and mostly right down to base) with long spreading hairs; leaves long-haired; upper calyx-teeth long-ciliate . . . . . 12.
9. Leaves narrowly oblong-ovate, 2–3 mm broad; corolla pure white . . . . . 89. **Th. rariflorus** C. Koch.
- + Leaves broader, the middle cauline 3–7 mm broad; corolla more or less colored . . . . . 10.
- 548 10. Leaves oblong-elliptical, the length/width index (2.5) 3–4 (5); corolla whitish, the limb with pale lilac spots . . . . . 91. **Th. armeniacus** Klok. et Shost.
- + Leaves oblong-ovate or more often ovate, the length/width index not exceeding 3.2; corolla pink, sometimes very pale, but not spotted . . . . . 11.
11. Stems covered with strongly recurved hairs 0.1–0.2 mm long; leaves glabrous; inflorescence often with 1–2 depauperate distant whorls . . . . . 88. **Th. collinus** M. B.



- + Stems covered with longer and less recurved hairs; leaves short-haired, rarely subglabrous; inflorescence a compact head (Kopet-Dag) . . . . . 90. *Th. transcaspicus* Klok.
- 12 (8). Stocky plants; flowering branches 2–5 cm long; inflorescence capitate . . . 13.
- + Plants not stocky; flowering branches from 7 to 11–30 cm long (rarely from 3 to 10 cm and then trailing shoots present and inflorescence elongate) . . . . . 15.
13. Calyx tubular, 5–6 mm long . . . . . 93. *Th. ararati-minoris* Klok. et Shost.
- + Calyx campanulate, 3 mm long . . . . . 14.
14. Leaves 4–7 mm long, (2) 2.5–4.5 mm broad; petiole to 2 mm long, in lower leaves equaling blade . . . . . 96. *Th. trautvetteri* Klok. et Shost.
- + Leaves 2–4 (6) mm long, 1–3 (4) mm broad, all short-petioled . . . . . 97. *Th. kjpgazi* A. Grossh.
15. Plants with short trailing sterile shoots; flowering branches 3–10 cm long; inflorescence oblong-capitate . . . . . 99. *Th. desjatovae* Ronn.
- + Plants without trailing sterile shoots; flowering branches longer; inflorescence different . . . . . 16.
16. Flowering branches 6.5–11 cm long, covered with hairs 1.5–1.6 mm long; inflorescence capitate; corolla white . . . . . 92. *Th. ziaratinus* Klok. et Shost.
- + Flowering branches longer, with shorter hairs; inflorescence mostly elongate or with a distant whorl; corolla lilac or purple . . . . . 17.
17. Flowering branches 10–13 cm long, densely covered under the inflorescence with rather long hairs; leaves to 17 mm long and 2.5–10 mm broad, ciliate to  $\frac{1}{3}$ – $\frac{1}{2}$  of the length; calyx 4–5 mm long . . . 95. *Th. transcaucasicus* Ronn.
- + Flowering branches 7–18 cm long, covered under the inflorescence with scattered hairs ca. 1 mm long and numerous short hairs; leaves to 12 mm long and 3–5 mm broad, ciliate to base of blade; calyx 3.25–4 mm long . . . . . 94. *Th. fominii* Klok. et Shost.
- 549
- 18 (6). Flowering branches 1–2.5 cm long; lower cauline leaves with petiole less than half length of blade; corolla pale, lilac-rose or whitish . . . . . 105. *Th. roseus* Schipcz.
- + Flowering branches longer; lower cauline leaves with petiole nearly equaling the blade; corolla pale or more rarely rose-lilac, brighter . . . . . 19.
19. Middle cauline leaves linear-spatulate or narrowly oblong-elliptical, 1–2 mm broad . . . . . 20.
- + Middle cauline leaves elliptical, 2–5 mm broad . . . . . 21.
20. Leaves linear-spatulate; inflorescence a compact head; pedicels very short; corolla intense dark lilac (European plants) . . . . . 102. *Th. baschkiriensis* Klok. et Shost.
- + Leaves narrowly oblong-elliptical; inflorescence loose, with a distant whorl; pedicels 1.5–4 mm long; corolla rather faint rose-lilac (Asian plants) . . . . . 101. *Th. rasitatus* Klok.

21. Flowering branches 10–15 cm long; leaves to 15 mm long, thin, herbaceous, with somewhat prominent veins; inflorescence rather loose; pedicels slightly shorter or longer than calyx . . . . . 104. *Th. zheguliensis* Klok. et Shost.  
+ Flowering branches 4–10 cm long; leaves to 10 mm long, coriaceous, with very prominent veins; inflorescence firm; pedicels much shorter than calyx . . . . . 22.
22. Middle cauline leaves elliptical or oblong-elliptical, 2–3 mm broad; calyx short-haired in lower part . . . . . 100. *Th. mugodzharcicus* Klok. et Shost.  
+ Middle cauline leaves broadly elliptical, 3–4 mm broad; calyx glabrous . . . . .  
. . . . . 103. *Th. guberlinensis* Iljin.

Series 1. *Eukotschyani* Klok. et Shost. in Uch. zap. Khar'k. Gos. univ. 6–7 (1936) 289. — Subshrubs, extensively lignified; stems usually more strongly branched than in other series; leaves petiolate, oblong, the length/width index 1–3; venation pseudomarginal; inflorescence capitate, oblong or elongate and interrupted; upper calyx-teeth ciliate or merely with short setae; corolla white or more rarely whitish, the lips with pale lilac spots.

A xerophytic upland series, represented only in the S. part of Transcaucasia and distributed outside the U.S.S.R. in N. Iran and Kurdistan.

- 550 84. *Th. eriophorus* Ronn. in Fedde Repert. XXXI (1932) 139; Ronniger in Grossg. Fl. Kavk. III, 336.

Subshrub; stems ascending, strongly branched, without decumbent shoots; whole plant white- or gray-tomentose; flowering branches 10–15 cm long, ca. 0.75 mm in diameter, covered under the inflorescence with long spreading hairs, with shorter hairs (about length of stem diameter) lower down; leaves petiolate, ovate-lanceolate, 11–13 mm long, 4–6 mm broad, narrowed at both ends, densely covered on both sides with rather long hairs and sessile glands; venation pseudomarginal; lateral veins 3 pairs, the lower pair reaching the leaf margin, inflorescence oblong, 2–6 cm long; pedicels densely woolly; calyx ca. 4.5 mm long, densely woolly, the tube with thick nerves; upper teeth lanceolate, ca. 1 mm long, terminating in a faceted point, long-ciliate; corolla white, copiously hairy. Fl. June–July.

Mountain slopes in the subalpine and alpine zones. — Caucasus: S. and E. Transc. (extreme S.), Tal. **Gen. distr.:** Arm.-Kurd., Iran. Described from Armenia (Arabkir). Type in Vienna?

85. *Th. kotschyanus* Boiss. et Hohen. in Boiss. Diagn. ser. 1, 5 (1844) 16 et Fl. or. IV (1879) 556; Ronniger in Grossg. Fl. Kavk. III, 336.

Subshrub; stems ascending, strongly branched, completely destitute of decumbent shoots; flowering branches 8–18 cm long, covered under the inflorescence with fairly

short recurved hairs; leaves petiolate, ovate or ovate-triangular, 8–14 mm long, 4–7 mm broad, subtruncate at base, obtuse, firm, coriaceous, sparsely ciliate to base of blade, the surface more or less hairy; venation pseudomarginal; lateral veins 3 pairs, thick, prominent, the lower pair reaching the leaf margin; glands distinct; inflorescence capitate; pedicels hairy; calyx narrowly campanulate, 4–5 mm long, the tube short-haired, the upper teeth lanceolate, acuminate, ciliate; corolla 6–7 mm long, white, densely hairy outside. June–July. (Plate XXX, Figure 3.)

Mountain slopes, up to subalpine altitudes. — Caucasus: S. and E. Transc. (S. part), Tal. Gen. distr.: Arm.-Kurd., Iran. Described from Iran. Type in Geneva.

Note. An exceedingly variable species. Ronniger lists three varieties (not counting the typical): 1) var. *glabrescens* Boiss. et Hohen. (l. c.), with glabrous leaves and ciliate upper calyx-teeth; 2) var. *hohenakeri* Ronn. (in Fedde, Repert. XXXI, 1932, 551 and in Grossg. l. c.), with glabrous leaves and glabrous upper calyx-teeth, and 3) var. *handelii* Ronn. (l. c.), with flowering branches 1–8 cm long, small leaves, 5–8 mm long, 2–5 mm broad, but apparently not differing from the typical form in anything but size. We have not detected any forms with completely glabrous leaves in the Caucasian material examined.

86. *Th. migricus* Klok. et Shost. in Tr. Bot. inst. Az FAN SSSR, II (1936) 302.

Subshrub; stems ascending, strongly branched, terminating in a fertile shoot; decumbent sterile shoots wanting; flowering branches 4–12 cm long, often branched in inflorescence, covered under the inflorescence with recurved hairs one-quarter to one-half length of stem diameter, the internodes long; leaves petiolate, oblong-ovate to broad-ovate, (6.5) 8–10 (12) mm long, 3–4.5 (7) mm broad, with length/width index 2–2.7, rounded or broadly cuneate at base, the margin sparsely ciliate to base of blade, the surface glabrous; venation pseudomarginal, the lateral veins prominent; glands distinct; inflorescence elongate, interrupted, individual dichasia distinctly pedunculate, subtended by narrowly lanceolate floral leaves, these larger than bracteoles; pedicels short-haired; calyx 3–4 mm long in flower, glabrous above; upper teeth lanceolate, the margin with short setae but devoid of long (multicellular) cilia; corolla whitish, with pale lilac spots on both lips; nutlets ellipsoid, ca. 0.8 mm long and 0.6 mm broad. June–July.

Dry mountain slopes at altitudes from 700 to 2500 m. — Caucasus: E. Transc. Endemic. Described from Armenia (Migri area between villages Karchevan and Agarak). Type in Baku.

Note. A deviation from the type has been observed in this species in a form with hairy leaves and ciliate upper calyx-teeth — *Th. migricus* f. *hirsutus* Klok. et Shost. (l. c.). The taxonomic status of this form is not clear; it may prove to be of hybrid origin.

87. *Th. fedtschenkoi* Ronn. in Fedde, Repert. XXXI (1932) 139; Ronn. in Grossg. Fl. Kavk. III, 337.

Subshrub; stems short-creeping, slender, branched, terminating in a fertile shoot; sterile decumbent shoots very short or wanting; flowering branches 3–6 cm long,



slender, covered under the inflorescence and lower down with short (to 0.1 mm), recurved hairs; leaves petiolate, ovate, 4–5 mm long, 2.25–3 mm broad, thick, coriaceous, with cilia ca. 1.1 mm long, the surface glabrous; venation pseudomarginal; lateral veins 2 pairs, thick prominent; glands copious, distinct; inflorescence capitate; pedicels short-haired, calyx 3.5–4 mm long, short-haired in lower part, glabrous above; upper teeth short-triangular, ca. 0.5 mm long, the margin with short setae, eciliate; corolla 6–7 mm long, white, hairy outside. June–July.

Mountain slopes, at altitudes from 1200 to 2500 m. — Caucasus: S. Transc. (Karabakh). Endemic. Described from Karabakh. Type (or cotype) in Baku.

Series 2. *Collini* Klok. et Shost. in Uch. zap. Khar'k. Gos. univ. 6–7 (1936) 289. — Differing from section Eukotschiani Klok. et Shost. in camptodromous venation; leaves often oblong-ovate; corolla in some species pink or even purple.

An Iranian-Transcaucasian series, penetrating into E. Kopetdag. A high-mountain plant.

88. *Th. collinus* M. B. Fl. taur.-cauc. III (1819) 401; Ronn. in Fedde Repert. XXXI, 141 and in Grossg. Fl. Kavk. III, 338.

Subshrub; stems ascending, strongly branched, without decumbent sterile shoots; flowering branches 7–12 cm long, covered all along with recurved hairs 0.1–0.2 mm long; leaves petiolate, oblong-ovate to ovate, 7–11 (13) mm long, (2) 3–5 mm broad, with length/width index 1.2–2.6, the surface glabrous; lateral veins 2 or 3 pairs, prominent; glands copious, distinct; inflorescence capitate, often with 1 or 2 distant whorls; calyx to 4 mm long in flower; upper teeth triangular, short, the margin with short setae, eciliate; corolla 6–7 mm long, pink. June–July.

Dry mountain slopes, up to subalpine zone. — Caucasus: Dag. (S.), S. and E. Transc. Endemic. Described from Transcaucasia. Type in Leningrad.

Note. Ronniger described six varieties of this species. The authentic specimens not being available, it has not been possible to determine their taxonomic status. It is clear, however, that at least half of them do not belong to this species.

555 Ronniger also described a hybrid *Th. collinus* × *Th. transcausicus* (*Th. georgicus* Ronn.) (in Grossg. Fl. Kavk. III, 1932, 345), displaying characters intermediate between the two parent species.

89. *Th. rariflorus* C. Koch in Linnaea, XXI (1848) 666; Ronn. in Fedde, Repert. XXI, 151, varietat. excl. and in Grossg. Fl. Kavk. III, 340.

Subshrub; stems ascending, strongly branched; flowering branches 3–8 cm long, slender, covered under the inflorescence and lower down with recurved hairs not exceeding 0.1 mm; basal leaves very small; cauline leaves short-cuneate to almost rounded at base, abruptly narrowed to a very short but distinct petiole, rather thick, narrowly oblong-ovate, 6–8 (10) mm long, 2–3 mm broad, the margin sparsely ciliate to base of blade, the surface glabrous, the midvein pronounced beneath, the lateral veins

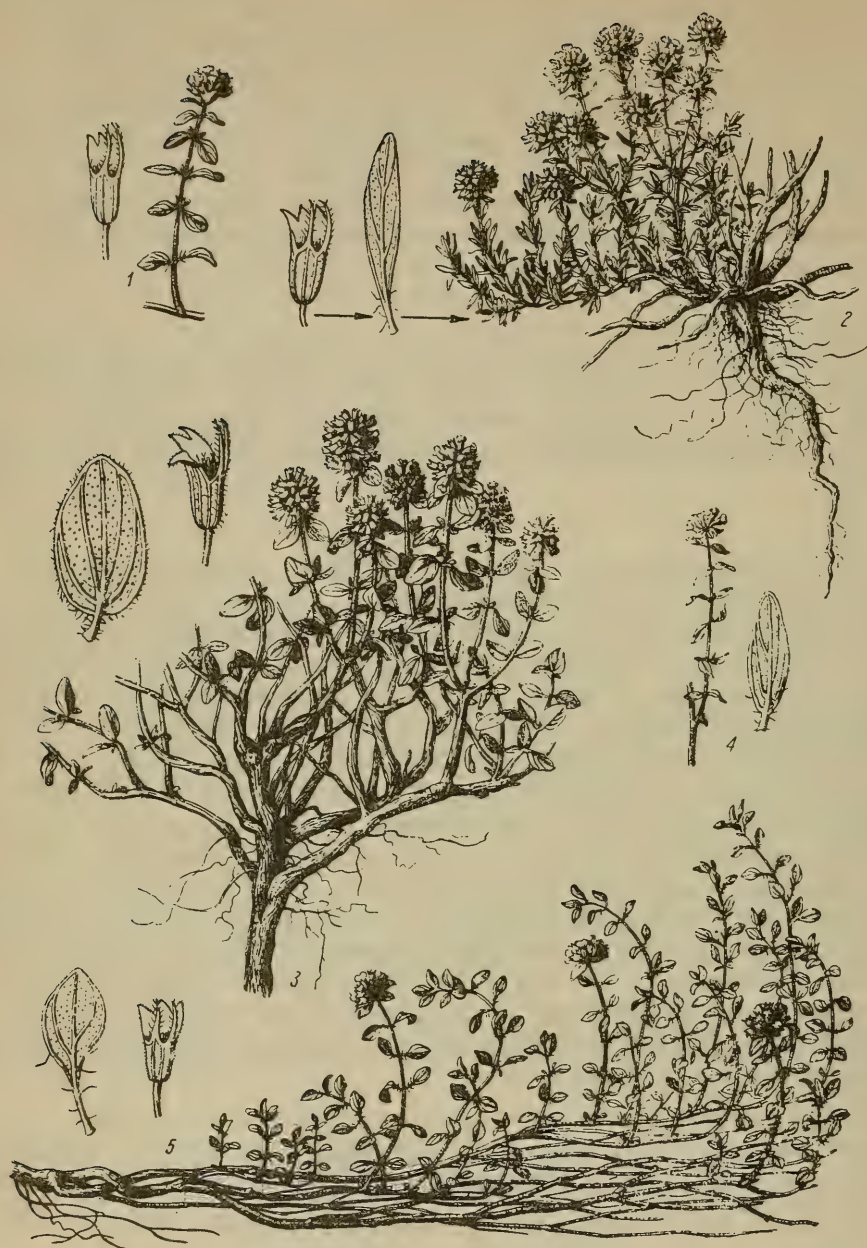


PLATE XXX. 1 – *Thymus guberlinensis* Iljin, branchlet and calyx; 2 – *Th. mugodzhariensis* Klok. et Shost., plant fragment, calyx, leaf; 3 – *Th. kotschyanus* Boiss. et Hohen., plant fragment, leaf, calyx; 4 – *Th. rariflorus* C. Koch, branchlet and leaf; 5 – *Th. binervulatus* Klok. et Shost., plant fragment, leaf, calyx.

rather indistinct; glands copious and very distinct; inflorescence capitate; pedicels covered with short recurved hairs; calyx campanulate, 3–3.5 mm long, short-haired below, glabrous above, the teeth short, sharply triangular, eciliate; corolla 4.5 mm long, white, hairy outside. June–July. (Plate XXX, Figure 4.)

Slopes in high mountain zones. — Caucasus: S. and E. Transc. **Gen. distr.:** Probably in Iran. Described from Transcaucasia. Type was in Berlin.

Note. Ronniger (in Grossheim) records two varieties of this species; one of these, var. *kochii* Ronn. is synonymized by him with *Th. parvifolius* C. Koch, non Opiz, and does not apparently differ from the typical form of the species; the second, var. *dzavacheticus* Ronn., characterized by hairy leaves and short-ciliate upper calyx-teeth, is most probably of hybrid derivation. It should be pointed out that, in setting up *Th. rariflorus* C. Koch, Ronniger accorded to it an exceedingly wide scope (see our papers: Chebretsy Evropeiskoi chasti SSSR, Uch. zap. Khar'k. Gos. univ. 14, 137; Chebretsy Kavkaza, Tr. Bot. inst. AzFAN, II, 283).

In addition to the varieties, Ronniger also describes a hybrid *Th. rariflorus* × *Th. transcaucasicus* (*Th. zedelmeyeri* Ronn.) (in Grossg., Fl. Kavk. III, 1932, 346). To judge by the description, the features of *Th. rariflorus* are clearly predominant.

90. *Th. transcaspicus* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954). — *Th. kotschyanus* auct. fl. As. Med. non Boiss. et Hohen.

556 A strongly lignified subshrub, with bushy branched stems; flowering branches herbaceous, 4–8 (11) cm long, whitish all along with dense subpatent-retrorse hairs shorter than stem diameter; leaves short-petioled, coriaceous, oblong-ovate or ovate, 2.5–14 (18) mm long, 1–7 (9) mm broad, with length/width index 1.8–3.2, abruptly narrowed at base, the petiole distinct, 1–1.5 mm long; cilia few, 1–1.5 mm long, confined to petiole; both surfaces sparsely or rarely rather densely covered with short hairs, rarely subglabrous; venation typically camptodromous; lateral veins 2 or 3 pairs, rather prominent beneath; glands large, very distinct; inflorescence a rather compact head, subtended and half-concealed by crowded upper leaves; pedicels short, densely covered with short hairs; calyx narrowly campanulate, 4–4.5 mm long, the tube short-haired; upper teeth lanceolate, fine-pointed, 0.75–1 mm long, eciliate; corolla pink or almost white, copiously hairy outside; nutlets short-ellipsoid, 1–1.25 mm long; the whole plant strongly camphor-scented. June–July.

Dry mountain slopes, up to 2300 m. — Centr. Asia: Mtn. Turkm. (Kopetdag). **Gen. distr.:** Iran (N. E.). Described from the northern foothills of Kopetdag (collected at rise from Aidere gorge to high plateau toward Nukhura). Type in Kiev.

91. *Th. armeniacus* Klok. et Shost. in Tr. Bot. inst. AzFAN SSSR, II (1936) 304.

Subshrub; stems ascending, branched, without decumbent sterile shoots; flowering branches 7–20 cm long, rather densely covered under the inflorescence with short or more often very short recurved hairs; leaves petiolate, oblong-elliptical, (8) 9.5–15 (17) mm long, (2.5) 3–5 (6) mm broad, with length/width index (2.5) 3–4 (5), the margin with isolated cilia to base of blade or eciliate, the surface glabrous; venation camptodromous; lateral veins slender, somewhat prominent; glands rather indistinct; inflorescence



usually branched, capitate, with 1 or 2 distant whorls, or oblong; dichasia distinctly pedunculate; pedicels covered with short retrorse-appressed hairs; calyx 3–3.75 (4) mm long in flower; upper teeth sharply triangular, with short setae but usually eciliate, rarely with few multicellular cilia; corolla whitish, with pale lilac spots on the limb; nutlets subglobose, 0.5–0.6 mm in diameter.

- 557 Mountain slopes and meadows in the subalpine and alpine zones. — Caucasus: Dag., S. and E. Transc. Endemic. Described from Armenia (Stepanavan). Type in Baku.

92. *Th. ziaratinus* Klok. et Shost. in Tr. Bot. inst. AzFAN SSSR, II (1936) 303.

Subshrub, with ascending branched stems, without decumbent sterile shoots; flowering branches 6.5–11 cm long, covered all along with long spreading hairs (1.5–1.6 mm); leaves petiolate, broad-ovate or suborbicular, rounded at base, 7–9.5 mm long, 5–7 (8) mm broad, with length/width index 1.1–1.5, long-haired on both sides; venation camptodromous; lateral veins somewhat prominent; glands scattered and rather indistinct; inflorescence capitate; dichasia distinctly pedunculate in fruit; pedicels covered with long spreading and short retrorse-appressed half the length of calyx in flower, equaling or even exceeding it in fruit; calyx at anthesis ca. 4 mm long, elongating to 5 mm in fruit, the tube long-haired; upper teeth broadly triangular, half the length of the lip, long-ciliate; corolla ca. 6 mm long, white; nutlets ellipsoid, ca. 0.8 mm long and 0.5–0.6 mm broad. July–August.

Mountain slopes in the subalpine zone. — Caucasus: E. Transc. (S. Karabakh). Endemic. Described from Mt. Ziarat. Type in Baku.

93. *Th. ararati-minoris* Klok. et Shost. in Tr. Bot. inst. AzFAN SSSR, II (1936) 304.

Subshrub; with ascending branched stems, without decumbent shoots; flowering branches 2–5.5 cm long, densely covered all along with slightly curved or undulate hairs of variable length (0.1 to 1 mm); leaves petiolate, ovate or ovate-rhomboid, (5) 6–11 mm long, (2) 3–4 (4.5) mm broad, with length/width index 1.5–2.8, covered on both sides (more densely above) with long undulate hairs; venation camptodromous, the lateral veins prominent; glands few but distinct; leaf surface under the indument characteristically pale green; lower cauline leaves rather markedly differing from the upper in more rounded blade and long petiole; inflorescence capitate; dichasia on very short distinct peduncles; pedicels long-haired; calyx tubular, 5–6 mm long, lilac, hairy all round, the lower teeth almost straight, the upper lanceolate, half the length of the lip, long-ciliate; corolla ca. 8 mm long, with whitish tube and pale lilac limb. August.

- 558 Mountain slopes. — Caucasus: S. Transc. Endemic. Described from Little Ararat. Type in Leningrad.

Note. A very distinctive species, discovered by Grossheim in 1919, but not collected since then.

94. *Th. fominii* Klok. et Shost. in Tr. Bot. inst. AzFAN SSSR, II (1936) 305.

Subshrub; stems rather short, more or less branched, terminating in a fertile shoot; sterile shoots arising from the stems, assurgent; flowering branches assurgent, 7–18 cm

long, covered all along with numerous retrorse-subappressed hairs ca. 0.1 mm long and scattered spreading hairs ca. 1 mm long, rather sparingly leafy; leaves petiolate, ciliate to base of blade, sparsely hairy on both sides, on the upper surface also minutely papillose; venation camptodromous, the veins prominent beneath; glands rather indistinct; middle cauline leaves ovate or broad-ovate, 8–12 mm long, 3–5.5 mm broad, half the length of internodes; lowermost leaves much shorter than others, orbicular, with petiole about as long as blade; inflorescence elongate, to 3.5 cm long, interrupted; dichasia pedunculate; pedicels as long as or somewhat longer than calyx, covered with short retrorse-appressed hairs; calyx 3.25–4 mm long in flower, long-haired below, glabrous above, covered with small papillae; upper teeth ciliate; corolla ca. 7.5 mm long, lilac, with white tube; nutlets ellipsoid, ca. 1 mm long, 0.5–0.6 mm broad. July.

Grassy slopes. — Caucasus: E. Transc. (S.). **Gen. distr.:** Arm.-Kurd., Iran. Described from Kurdistan. Type in Baku.

95. *Th. transcaucasicus* Ronn. in Fedde, Repert. XXXI (1932) 140 and in Grossg. Fl. Kavk. III (1932) 338. — *Th. superbus* Ronn. l. c. (1932) 141 and in Grossg. op. cit. 339.

Subshrub, with strongly branched ascending stems, without decumbent sterile shoots; flowering branches 10–30 cm long, often branched in turn, densely covered under the inflorescence and lower down with spreading hairs equaling stem diameter or shorter; leaves petiolate, oblong-ovate to broadly ovate-orbicular, 5.5–17 mm long, 2.5–10 mm broad, fairly thin, ciliate in lower third or up to the middle, more or less hairy on both sides or only beneath, rarely subglabrous; venation camptodromous; lateral veins 2 or 3 pairs; glands rather indistinct; inflorescence capitate or oblong, often with a distant whorl; pedicels shorter than to nearly equaling calyx, hairy; calyx 4–5 mm long; upper 559 teeth narrowly lanceolate, ciliate; corolla 6–8 mm long, purple. July–August.

Mountain slopes and meadows in the subalpine and alpine zones. — Caucasus: W. (E. part), S. and E. Transc. **Gen. distr.:** Probably in Arm.-Kurd. Described from Transcaucasia. Type (or cotype) in Baku.

Note. We have combined two of the species described by Ronniger (see: Cherbetsky Kavkaza, Tr. Bot. inst. AzFAN SSSR, II). Ronniger established three varieties for each of them, the differences between them relating to degree of development or reduction of indument.

96. *Th. trautvetteri* Klok. et Shost. in Tr. Bot. inst. AzFAN SSSR, II (1936) 303. — *Th. serpyllum* var. *incana* Trautv. in Tr. Bot. sada (1881) 101.

Subshrub, with ascending branched stems, without decumbent shoots; the whole plant white-tomentose; flowering branches 3–5 cm long, covered under the inflorescence with long spreading hairs; leaves petiolate, broad-ovate, 4–7 mm long, (2) 2.5–4.5 mm broad, with length/width index 1.8–2.6, covered on both sides with short bristles and long multicellular hairs; venation camptodromous; lateral veins prominent; glands distinct; lower cauline leaves with petiole as long as blade; inflorescence capitate; dichasia pedunculate; pedicels much shorter than calyx, covered with long spreading hairs; calyx campanulate, 3–3.25 mm long in flower, long-haired all round; upper teeth densely ciliate; corolla with white tube and lilac limb; nutlets ellipsoid, ca. 0.9 mm long and 0.6 mm broad. May–June.

Mountain slopes. — Caucasus: Tal. Endemic. Described from Zuvand district (village Lerik). Type in Leningrad.

Note. This species was first collected by Radde in 1880 and then by Prilipko in 1930. So far only three locations are known (Lerik, Lyulyakeran, Kyz-Yurty). The specimens collected all have female flowers, with corolla 3.5–4 mm long; hermaphrodite flowers are as yet unknown.

97. *Th. kja pazi* Grossh. in *Izv. AzFAN SSSR*, 10 (1944) 42.

Subshrubs, with ascending branched stems, without decumbent shoots; flowering branches 2–5 cm long, densely covered all along with long spreading hairs; leaves short-petioled, the upper cauline ovate or broad-ovate, 3–4 (6) mm long, 2–3 (4) mm broad, densely covered with long spreading hairs, almost shaggy; lower leaves smaller, ovate, 2–3 mm long, glabrous; all leaves with pronounced midvein beneath; glands  
560 rather indistinct; inflorescence capitate, few-flowered; calyx ca. 3 mm long, villous; upper teeth triangular, very short, ciliate; corolla ca. 5 mm long, pink. July–August.

Calcareous slopes in mountains. — Caucasus: E. Transc. Endemic. Described from Azerbaidzhan (Mt. Kyapyaz). Type in Baku.

Series 3. *Subcollini* Klok. — Subshrubs with branched stems; sterile shoots more or less developed, trailing; leaves petiolate, ovate; upper calyx-teeth ciliate; corolla purple or pink.

This series consists of two endemic Transcaucasian species. Its position in the systematics of the genus is not quite clear.

98. *Th. grossheimii* Ronn. in Fedde, *Repert.* XXXI (1932) 148 and in Grossg. *Fl. Kavk.* III (1932) 335.

Subshrub; stems branched; sterile shoots long, trailing; flowering branches arising in regular rows from the main stem ramifications, 3–8 cm long, ca. 0.75 mm in diameter, covered under the inflorescence and lower down with spreading hairs, these shorter than stem diameter; leaves petiolate, ovate or ovate-triangular, 8–10 mm long, 5–7 mm broad, ciliate to base of blade, the surface glabrous; lateral veins prominent, 2 or 3 pairs; venation camptodromous; inflorescence capitate; pedicels short-haired; calyx 4–5 mm long, hairy below, glabrous above; upper teeth narrowly lanceolate, ciliate; corolla to 3 mm long, purple. July.

Mountain slopes in the subalpine zone. — Caucasus: S. and E. Transc. (Karabakh, Adzharo-Imeretinskii Range, Bakhmaro). Endemic. Described from Adzharo-Imeretinskii Range.

Note. Besides the typical form, with glabrous leaves and stem with hairs shorter than its diameter, Ronniger established two varieties: var. *imereticus* Ronn. and var. *subvestitus* Ronn. with hairy leaves and somewhat longer hairs on the stem. The second of these varieties, with more copious indument, may prove to be a distinct geographic race.



99. *Th. desjatovae* Ronn. in Fedde, Repert. XXXI (1932) 151 and in Grossg. Fl. Kavk. III (1932) 335, varietat. excl.

Subshrub; stems short, branched; sterile shoots short, trailing; flowering branches arched-ascending, 3–10 cm long, 0.75–1 mm in diameter, covered under the inflorescence and lower down with short and long (the latter equaling stem diameter) flexuous-patent hairs; leaves petiolate, ovate or oblong-ovate, 8–13 mm long, 3–7 mm broad, 561 sparsely hairy on both sides or sometimes only beneath; venation camptodromous; lateral veins 2 or 3 pairs; inflorescence oblong-capitate, elongate; pedicels densely hairy; calyx ca. 4 mm long in flower, with hairy tube; upper teeth narrowly lanceolate, long-ciliate; corolla 6–7 mm long, pink. June–July.

Alpine meadows. — Caucasus: W. (E. part) and E. Transc. Endemic. Described from cultivated specimens originating from Kutaisi.

Note. Five varieties are listed by the author; their taxonomic significance is, however, uncertain.

Series 4. *Suffruticosi* Klok. et Shost. in Uch. zap. Khar'k. Gos. univ. 6–7 (1936) 295 (pro grege) and 14 (1938) 139. — Stems more or less ascending, strongly branched, terminating in a fertile shoot; stems covered under the inflorescence with short retrorse-appressed hairs; leaves petiolate, the lower cauline with more rounded blade and petiole about equaling blade, markedly differing in shape from the upper; venation camptodromous; inflorescence capitate, usually compact; calyx 3.5–5 mm long, sparsely hairy; upper teeth eciliate; corolla bright lilac.

Stony slopes or outcrops, from Centr. Transvolga region to N. Balkhash region.

100. *Th. mugodzharcus* Klok. et Shost. in Izv. Bot. sada, 3–4 (1931) 537 and in Uch. zap. Khar'k. Gos. univ. 14 (1938) 131.

Subshrub; stems ascending, extensively lignified, strongly branched; flowering branches 5–10 cm long, covered under the inflorescence with short recurved hairs; leaves (except the lowermost) short-petioled, elliptical or oblong-elliptical, (5) 6–9.5 (10.5) mm long, (1.5) 2–3 (3.5) mm broad, sparsely short-ciliate in lower third; lateral veins very prominent on lower side; glands rather indistinct; lowermost cauline leaves broadly elliptical, often suborbicular, with petiole nearly as long as blade; inflorescence capitate, compact; pedicels one-third to two-thirds the length of calyx; calyx narrowly campanulate, 3.5–4 mm long, short-haired below, glabrous above; upper teeth sharp-angled, the margin with short setae but completely eciliate; corolla dark lilac; nutlets ovoid, ca. 0.75 mm long. Fl. June–August. (Plate XXX, Figure 2.)

Stony slopes, taluses, various rock outcrops. — European part: V.-Kama (S.), Transv. (S. E.); W. Siberia: U. Tob.; Centr. Asia: Ar.-Casp. (N. W.). Endemic. Described from Mugodzhary (upper reaches of Taldyk). Type in Leningrad.

562 Note. Forming numerous crosses with *Th. serpyllum* L., more rarely with *Th. marschallianus* Willd.

101. *Th. rasitatus* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems somewhat ascending, bushy-branched, extensively lignified, terminating in more or less ascending fertile shoot; flowering branches arising from terminal ramifications of the stems, ascending or assurgent, 3–8 cm long, covered under the inflorescence with very short recurved hairs, scarcely scabrous below, lilac or dark lilac; leaves petiolate, mostly oblong-elliptical, relatively long and narrow, sparsely ciliate in lower third or somewhat higher up, the surface glabrous; lateral veins 2 or 3 pairs, rather thick, very prominent beneath; glands quite distinct; basal leaves usually oblong-ovate, 2–4 mm long, ca. 1 mm broad, narrowed to a short broad petiole; cauline leaves 4–10 mm long, 1–2 mm broad, the lower with comparatively broader oblong-ovate blade and longer petiole (often not much shorter than blade); inflorescence capitate, rather small, often with a depauperate subdistant whorl; pedicels 1.5–4 (5) mm long, densely covered with short recurved hairs; calyx narrowly campanulate, 3–4 mm long, covered (especially below) with short or very short hairs; upper teeth lanceolate or narrowly lanceolate, with naked margin; corolla 6 mm long, rather dull rose-lilac; nutlets ellipsoid, ca. 0.8–0.9 mm long, dark brown. June–August.

Stony or steppe slopes, on granite grit. — W. Siberia: Irt. (S.); Centr. Asia: Balkh. (N.). Described from former Karkaralinskii uezd. Type in Leningrad.

Note. Apparently vicarious in relation to *Th. mugodzharcicus* Klok. et Shost. of W. Kazakhstan, from which this species differs in having narrower leaves with distinct glands.

102. *Th. baschkiriensis* Klok. et Shost. in Izv. Bot. sada, 3–4 (1931) 533 and in Uch. zap. Khar'k. Gos. univ. 14 (1931) 533; Sprygin in Sov. bot. 4 (1934) 71.

563 Subshrub, rather densely cespitose; stems slender, decumbent, rather short, strongly branched, with ascending ramifications terminating in a fertile shoot; flowering branches 2–6 (7) cm long, covered under the inflorescence with short recurved hairs; leaves (except the lowermost) petiolate, linear-spatulate, 5.5–7.5 (9) mm long, (1) 1.5–1.75 (2) mm broad, ciliate nearly to the middle; lateral veins prominent on the lower side; glands distinct; lower leaves on flowering branches rounded-rhomboid, petiole nearly as long as blade; inflorescence capitate, compact; pedicels very short; calyx tubular-campanulate, ca. 3.5 mm long, sparsely hairy on the nerves below, glabrous above; upper teeth sharply triangular, the margin with short setae, eciliate; corolla dark lilac. July–August.

Stony slopes, Tatarian formation outcrops, stony calcareous steppe. — European part: Transv., V.-Kama (S.). Endemic. Described from Bashkiria (village Togus-Temir). Type in Leningrad.

Note. The distribution of this species was thoroughly investigated by I. I. Sprygin (see his paper: Vykhody porod tatarskogo yarusa permskoi sistemy kak odin iz tsentrov vidoobrazovaniya v gruppe kal'kofil'nykh rastenii (Outcrops of the Tatarian formation of the Permian system as a center of speciation among calciphile plants), Sov. bot., 4, 1934, 61–74). Beside the typical form described, a form with sparsely-haired, somewhat shorter and broader leaves (to 2.5 mm broad) has also been recorded as *f. hirsutus* Klok. et Shost. (1938); the taxonomic standing of this form is as yet uncertain.

Crosses are known between *Th. serpyllum* L. and *Th. marschallianus* Willd.

103. *Th. guberlinensis* Iljin in Bot. mat. gerb. I, 5 (1920) 18; Klok. and Shost. in Uch. zap. Khar'k. Gos. univ. 14, 133.

Subshrub; stems ascending, strongly branched, woody; flowering branches 4–7 cm long, covered under the inflorescence with short retrorse-appressed hairs; leaves petiolate, broadly elliptical, 6–10 mm long, 3–4 mm broad, ciliate in lower third; lateral veins prominent on the lower side; glands distinct; lower leaves often with petiole as long as blade; inflorescence capitate; pedicels one-quarter to one-half the length of calyx; calyx campanulate, 3.5–4 mm long, lilac, with colored nerves and teeth, sparsely hairy only below; upper teeth triangular, short, the margin with short setae, eciliate; corolla bright lilac, hairy outside; nutlets subglobose, ca. 0.75 mm in diameter, dark brown. June. (Plate XXX, Figure 1.).

Stony steppes and rocks. — W. Siberia: U. Tob. (Guberlinsk Mts.). Endemic. Described from Guberlinsk mountains. Type in Leningrad.

104. *Th. zheguliensis* Klok. et Shost. in Izv. Bot. sada, 3–4 (1931) 547 and in Uch. zap. Khar'k. Gos. univ. 14 (1938) 132.

Subshrub; stems rather slender, ascending, branched, terminating in a fertile shoot; 564 flowering branches erect, 10–15 cm long, covered under the inflorescence with short retrorse-appressed hairs; leaves mostly long-petioled, elliptical, 7–15 mm long, (2) 2.5–5 mm broad, ciliate to base of blade; lateral veins slender, distinct; glands rather indistinct; lower cauline leaves orbicular, thin, herbaceous, with petiole as long as blade; inflorescence capitate, sometimes branched, rather loose; pedicels in flower slightly shorter than calyx, in fruit as long or longer; calyx narrowly campanulate, 4–5 mm long; upper teeth lance-triangular, the margin with short setae, eciliate; corolla bright raspberry-colored. July–August.

Stony steppes, limestone, dolomite and chalk outcrops, in “mountain pinetums” and in savin thickets. — European part: V.-Kama, V.-Don, Transv. Endemic. Described from Zhiguli Mts. Type in Leningrad.

Note. The distribution of this species is also discussed in Sprygin's paper (see under *Th. bashkiriensis* Klok. et Shost.). In the Middle Volga region, *Th. zheguliensis* Klok. et Shost. forms numerous crosses with *Th. marschallianus* Willd., crosses with *Th. dubjanskii* Klok. et Shost. occur less frequently. *Th. zheguliensis* is a characteristic plant of the “mountain pinetums” of the Volga Basin.

105. *Th. roseus* Schipcz. in Bot. mat. gerb. 24–25 (1921) 95; Serg. in Kryl. Fl. Zap. Sib. IX, 2389.

Subshrub; stems rather stout, repeatedly branched, extensively woody; sterile shoots forming an extension of stem ramifications or arising from them, short-trailing and obliquely ascending; flowering branches 1–2.5 cm long, covered under the inflorescence with very short retrorse-appressed hairs, lilac; basal leaves oblong-elliptical or ovate, 2–3.5 mm long, ca. 1 mm broad; cauline leaves short-petioled, obovate or oblong-obovate, spatulate, rarely oblong-elliptical or oblong-ovate, 4–9 mm long, 1.75–3.5 mm broad, with length/width index 2–3.5, mostly broadest above the middle; lower cauline leaves with petiole less than half length of blade, the margin with cilia not extending to



the middle, the surface glabrous; lateral veins 2 or 3 pairs, rather thick but not very prominent; glands fairly distinct; inflorescence capitate; floral leaves ovate-rhomboid or elliptical, somewhat angular, whitish at base or up to the middle on the upper side, semimembranous; pedicels to 1.5 mm long, densely covered with short retrorse hairs; calyx narrowly campanulate, 3.75–4.25 mm long, sparsely covered below with short subappressed hairs; upper teeth narrowly lanceolate, acuminate, eciliate; corolla ca. 5 mm long, lilac-rose, pale or whitish; the whole plant with a pleasant resinous scent. June–August.

Granite cliffs, stony slopes and taluses. — W. Siberia: Irt., Alt.; Centr. Asia: Balkh. Described from S. part of former Semipalatinsk uezd (Kandylatyi Mts.). Type in Leningrad.

Series 5. *Binervulati* Klok. et Shost. in Uch. zap. Khar'k. Gos. univ. 6–7 (1936) 295. — Stems branched, terminating in a fertile shoot; leaf venation pseudomarginal; calyx short-haired, the upper teeth ciliate; corolla pale lilac.

An apparently monotypic series, akin to *Suffruticosi* Klok. et Shost.

106. *Th. binervulatus* Klok. et Shost. in Zhurn. Inst. bot. AN USSR, 9/17 (1936) 196 and in Uch. zap. Khar'k. Gos. univ. 14 (1938) 133. — *lc.*: Klok. and Shost. op. cit. (1936) Fig. 5.

Subshrub; stems slender, branched, terminating in a fertile shoot; flowering branches assurgent, covered under the inflorescence with short recurved hairs; leaves petiolate, broadly elliptical, 8–9 mm long, 3–5 (most frequently 4.25) mm broad, ciliate in lower third; venation pseudomarginal; lateral veins only 2 pairs, the lower nearly reaching the leaf margin and merging with the upper, this framing the apex; glands small; inflorescence capitate; calyx tubular-campanulate, 3.25–4 mm long in flower, 4.5–5 mm in fruit, short-haired; upper teeth sharply triangular, copiously ciliate; corolla one-and-a-half times as long as calyx, pale lilac; nutlets ellipsoid, 0.6 mm long. Fl. June–July. (Plate XXX, Figure 5.).

Rocks. — European part: V.-Kama. Endemic. Described from the territory of Simskii plant ("Zhukova Shishka"). Type in Leningrad.

Note. This distinctive species is so far known only from the classical location.

Section 5. *Subbracteati* Klok. — *Grex Subbracteati* Klok. et Shost. in Uch. zap. Khar'k. Gos. univ. 6–7 (1936) 291 and 14 (1938) 134. — Subshrubs; stems long, terminating in a mostly fertile or (in series *Humillimi* Klok. et Shost.) in sterile trailing extension-shoot; lateral trailing sterile shoots borne on stems terminating in a sterile shoot and often also arising from the rhizome (only in one Transcaucasian species, that may have perhaps been incorrectly included in this section, no sterile shoots whatever have been observed); hairs on stem mostly recurved, much more rarely spreading, short or rarely elongated under the inflorescence; leaves sessile or petiolate, narrowly linear-acicular

to oblong-elliptical, mostly narrow or very narrow, never broad (length/width index 3.5–20), the width of middle cauline leaves ranging in various species from 0.25 to 6 mm; venation always camptodromous; inflorescence capitate, usually compact, rarely somewhat loose; calyx 3–6 mm long, the upper teeth ciliate or more often eciliate; corolla lilac, more rarely (in the most easterly species) pink.

Plants of stony slopes, more rarely of dry steppes or sands, distributed from the northern parts of the Balkan Peninsula to Mongolia.

1. Trailing sterile shoots absent; cauline leaves oblong-elliptical to linear-elliptical, ciliate nearly to apex; inflorescence elongate-capitate, often interrupted in lower part, 1–3 cm long; upper calyx-teeth eciliate . . . . . 120. *Th. hadzhievii* Grossh.
- + Trailing sterile shoots more or less developed; combination of other characters different . . . . . 2.
2. Leaves narrowly linear-acicular, with firmly revolute margins, the surface covered with minute bristles (psammophilous plants of the lower reaches of Dnieper) . . . . . 125. *Th. borysthenicus* Klok. et Shost.
- + Leaves differently shaped, not revolute-margined, usually glabrous (other regions) . . . . . 3.
3. Leaves 0.25–0.75 mm broad, ciliate along the whole margin or nearly up to apex . . . . . 4.
- + Leaves not so narrow, without cilia so close to apex . . . . . 7.
4. Leaves flat (Ciscaucasia) . . . . . 124. *Th. majkopensis* Klok. et Shost.
- + Leaves channeled on each side of midvein (plants of Crimea-Novorossiisk area) . . . . . 5.
5. Leaves narrowly linear, not dilated toward apex, glabrous; upper calyx-teeth ciliate . . . . . 123. *Th. helendzhicus* Klok. et Shost.
- + Leaves narrowly linear-spatulate, broadest in distal third, covered with hairs or at least minute bristles and then upper calyx-teeth eciliate (Crimea) . . . . . 6.
6. Leaves hairy; upper calyx-teeth beset with cilia and short setae . . . . . 121. *Th. pseudohumillimus* Klok. et Shost.
- + Leaf surface and margin of upper calyx-teeth only with short setae . . . . . 122. *Th. tauricus* Klok. et Shost.
- 7 (3). Leaves linear-spatulate or (in one Transcaucasian species) oblong-spatulate, broadest in distal third . . . . . 8.
- + Leaves oblong-elliptical to sublinear, broadest about the middle . . . . . 12.
8. Upper calyx-teeth eciliate (riverside sands) . . . . . 126. *Th. pallasianus* H. Braun.
- + Upper calyx-teeth ciliate (other locations) . . . . . 9.
9. Leaves oblong-spatulate to subobovate, 2–4 mm broad, ciliate in lower part (E. Transc.) . . . . . 112. *Th. karjaginii* Grossh.
- + Leaves linear-spatulate, narrower, ciliate to the middle or higher up (other regions) . . . . . 10.
10. Trailing sterile shoots to 50 cm long; calyx 4.5–5 mm long (W. Georgia) . . . . . 108. *Th. ladjanuricus* Kem.-Nat.
- + Trailing sterile shoots (and stems) much shorter (other regions) . . . . . 11.

11. Leaves subsessile, 0.75–1.5 mm broad . . . . . 109. *Th. dagestanicus* Klok. et Shost.  
+ Leaves with longer petiole, 1.5–2 (2.5) mm broad . . . . . 107. *Th. eupatoriensis* Klok. et Shost.
- 12 (7). Upper calyx-teeth ciliate . . . . . 13.  
+ Upper calyx-teeth eciliate . . . . . 19.
13. Calyx small, 2.5–3 mm long (Altai) . . . . . 136. *Th. petraeus* Serg.  
+ Calyx larger (other regions) . . . . . 14.
14. Calyx at anthesis ca. 4 mm or up to 5.5 mm long (Caucasus) . . . . . 15.  
+ Calyx at anthesis 2.75–3.5 mm long (European part of the U.S.S.R.) . . . . . 16.
15. Leaves sessile, narrowly oblong-elliptical, 1.25–2 mm broad, ciliate to the middle or higher up . . . . . 110. *Th. lipskyi* Klok. et Shost.  
+ Leaves short-petioled, oblong-elliptical, 2–3 (5) mm broad, ciliate only in lower third . . . . . 111. *Th. sosnowskyi* Grossh.
- 16 (14). Leaves densely hairy on both sides; the whole plant whitish-lanate . . . . . 17.  
568 + Leaves glabrous . . . . . 18.
17. Leaves with a very short but distinct petiole; corolla dark lilac (Azov region) . . . . . 116. *Th. kalmiussicus* Klok. et Shost.  
+ Leaves sessile; corolla pale lilac (Transvolga region) . . . . . 127. *Th. lanulosus* Klok. et Shost.
18. Leaves oblong-elliptical, 1.5–2.5 mm broad, stems covered under the inflorescence with short retrorse-appressed hairs . . . . . 113. *Th. moldavicus* Klok. et Shost.  
+ Leaves linear-elliptical, 0.75–1.5 mm broad, covered under the inflorescence with longer spreading hairs . . . . . 114. *Th. pseudograniticus* Klok. et Shost.
- 19 (12). Middle cauline leaves without a distinct petiole (the lowermost sometimes relatively long-petioled); leaves of trailing sterile shoots with a very short petiole or sessile (cf. *Th. nerczensis* Klok.\*) . . . . . 20.  
+ All leaves with a distinct short petiole . . . . . 22.
20. Leaves narrowly linear-elliptical, 0.75–1.25 (1.5) mm broad; calyx ca. 3.5 mm long (plants growing on granites in the Azov Sea area) . . . . . 115. *Th. graniticus* Klok. et Shost.  
+ Leaves not less than 1–2 (2.5) mm broad; calyx 3.5–4 mm long (other regions and habitats: from Transvolga region eastward) . . . . . 20.
21. Flowering branches flesh-colored, to 15 (17) cm long; leaves yellowish-green, (1) 1.5–3 (3.5) mm broad; corolla pink . . . . . 128. *Th. kirgisorum* Dub.  
+ Flowering branches greenish, to 7 cm long; leaves light green, 1–2 (2.5) mm broad; corolla dark lilac . . . . . 129. *Th. kasakstanicus* Klok. et Shost.
22. Leaves oblong-ovate, 9–11 mm long, 1.5–6 mm broad; calyx 4–5 mm long . . . . . 133. *Th. cuneatus* Klok.  
+ Leaves oblong-elliptical or linear-elliptical, with a different length to width ratio, not more than 4 mm broad; calyx usually shorter . . . . . 23.

\* An E. Siberian species in which the leaves of flowering shoots have rather indistinct petioles.



23. Stems covered under the inflorescence with relatively long but recurved hairs equaling stem diameter, often terminating in a trailing sterile shoot to 12 cm long; leaves of fertile shoots with rather indistinct petiole; corolla lilac-purple . . . . . 135. *Th. nerczensis* Klok.
- +  
569 Stems covered under the inflorescence with hairs shorter than stem diameter; terminal trailing sterile shoots wanting; leaves of fertile shoots distinctly petiolate; corolla usually paler . . . . . 24.
24. Cauline leaves with petiole to 5 mm long . . . . . 134. *Th. irtyschensis* Klok.
- + Cauline leaves short-petioled . . . . . 25.
25. Leaves 7–20 mm long, 1.5–5 mm broad . . . . . 26.
- + Leaves much smaller . . . . . 27.
26. Flowering branches 6–15 cm long; leaves with rather indistinct lateral veins and glands; pedicels slightly shorter than to as long as calyx; calyx in flower 4–4.5 mm long . . . . . 131. *Th. eltonicus* Klok. et Shost.
- + Flowering branches 4–8 cm long; lateral veins on leaf underside prominent; glands numerous and very distinct; pedicels 2–2.5 mm long; calyx in flower 3.5–4 mm long, in fruit to 5.5 mm . . . . . 132. *Th. incertus* Klok.
- 27 (25). Flowering branches 1.5–4 cm long (mountain areas of Lake Balkhash region) . . . . . 130. *Th. eremita* Klok.
- + Flowering branches to 10 cm long (plants of the European part of the U.S.S.R. not extending to the east of Volga) . . . . . 28.
28. Leaves 2–3 (4) mm broad, ciliate in lower half; calyx 4–4.5 mm long, dark lilac . . . . . 119. *Th. dubjanskii* Klok. et Shost.
- + Leaves 1–2 (2.5) mm broad, sparsely ciliate only at base; calyx 3.25–4 mm long, green or lilac (more westerly regions) . . . . . 29.
29. Leaves oblong-elliptical or elliptical, rather small, 5–10 mm long; corolla lilac; growing only on chalk outcrops . . . 118. *Th. cretaceus* Klok. et Shost.
- + Leaves oblong-elliptical or linear-elliptical, 8–13 (15) mm long; corolla somewhat paler; growing on limestone or shale . . . . . 117. *Th. calcareus* Klok. et Shost.

Series 1. *Pseudocarnosuli* Klok. et Shost. in Uch. zap. Khar'k. Gos. univ. 6–7 (1936) 291 and 14 (1938) 134. – Stems terminating in a fertile shoot; trailing sterile shoots all lateral or some arising from rootstock; leaves short-petioled or the lower cauline with a relatively long petiole, to 2 mm broad, in one species to 4 mm broad; upper calyx-teeth ciliate or much more rarely (in the more easterly steppe species) eciliate.

A southern series of the section, occurring in Crimea and in the Caucasus (as far as E. Transcaucasia), as well as in the steppe regions of the European part of the U.S.S.R., not extending beyond the Volga. This series has here been adopted in its wider scope and  
570 will have to be further subdivided.

107. *Th. eupatoriensis* Klok. et Shost. in Tr. Bot. inst. AN SSSR, I, 2 (1936) 285 and in Uch. zap. Khar'k. Gos. univ. 14 (1938) 134.

Subshrub; stems creeping, terminating in a fertile shoot; sterile shoots trailing or prostrate, arising from the stems or from rootstock; flowering branches erect, 3–7 cm long, covered under the inflorescence with retrorse hairs not exceeding stem diameter; basal leaves crowded at base of branches, sessile, elliptical, small; cauline leaves petiolate, spatulate, 6–12 mm long, 1.5–2 (2.5) mm broad, petiole half the length of blade or shorter, sometimes longer than the whole blade; leaves of sterile shoots petiolate, oblong to oblong-spatulate, curved sideways, to 18 mm long, 1.5–2 mm broad; all leaves ciliate to the middle or higher up, with glabrous surface, the glands rather indistinct, the veins somewhat prominent; inflorescence capitate, sometimes with a distant whorl; pedicels distinct; calyx tubular-campanulate, 4–4.5 mm long in flower, to 6 mm in fruit, green or lilac, hairy in lower part, glabrous above; upper teeth long-ciliate; corolla lilac; nutlets ellipsoid, ca. 1 mm long. Fl. May–June.

Steppe slopes with calcareous subsoil. — European part: Crimea (lowland part of the Peninsula). Endemic. Described from the Yevpatoria district (sovkhoz Tagaily to the west of Bulgakov settlement). Type deposited in Khar'kov; cotype in Simferopol (herbarium of the Simferopol Museum).

Note. A very distinctive species, collected in several locations by P. K. Kozlov and described from his material.

108. *Th. ladjanuricus* Kem.-Nat. in Tr. Tbil. Bot. inst. II (1937) 133.

Subshrub; stems very long, creeping, terminating in a sterile shoot; lateral sterile shoots arising from the stems equally long (to 50 cm), trailing with dense leaves, and short internodes; flowering branches short, from 2 cm, patent-haired, rather sparingly leafy arising from the stems in loose regular rows; leaves linear-spatulate or curved, narrowly linear-acinaciform, to 10 mm long and 3.5 mm broad on fertile shoots, to 20 mm on the sterile, long-ciliate in lower part, the surface glabrous; inflorescence capitate or oblong-capitate; floral leaves attenuate from broadly ovate base to linear-lanceolate apex, 571 the lower greatly exceeding the flowers; pedicels 1–1.5 mm long, short-haired; calyx tubular-campanulate, 4.5–5 mm long, hairy all round; upper teeth lanceolate, acute, ciliate, the cilia longer on lateral teeth; corolla 6–7 mm long, with narrow tube, pink; nutlets subglobose, brown, minutely spotted. July–September.

Stony taluses. — Caucasus: W. Transc. Endemic. Described from Lechkhumi-Ladzhanura gorge, collected on taluses in a narrow pass Erpiri, near village Acharis-Khidi. Type in Tbilisi.

So far known only from the single location indicated above. We have not seen the specimens, and the description is based on that of the authority, being slightly abbreviated and including certain modifications in terminology. To judge by the description, the species is sufficiently distinctive, but it can just about be included in this series. The authoritative description does not state whether the leaves are petiolate; nor is there any indication of the lower limit of leaf size range.

109. *Th. dagestanicus* Klok. et Shost. in Tr. Bot. inst. AzFAN SSSR, II (1936) 308.

Subshrub; stems slender, terminating in an ascending fertile shoot or producing herbaceous trailing shoots; flowering branches arising from stems in parallel rows, erect, (1.5) 3–8 cm long, covered under the inflorescence with recurved or retrorse hairs shorter than stem diameter; leaves slightly petiolate or sessile, the middle cauline narrowly spatulate, 6–10.5 (11.5) mm long, 0.75–1.5 mm broad, with length/width index 6.6–10.5, ciliate to the middle or higher up, the surface glabrous, the veins prominent, the glands rather indistinct; leaves of uppermost pair (under the inflorescence) narrowly oblong; floral leaves lanceolate, with somewhat rounded base or triangular-ovate; inflorescence capitate, compact; pedicels much shorter than calyx; calyx narrowly campanulate, 3.5–4.5 mm long in flower, hairy below, glabrous above; upper teeth triangular, short, ciliate; corolla ca. 7 mm long, bright lilac. July–August.

Calcareous mountain slopes, at altitudes from 750 to 1800 m. — Caucasus: Dag. Endemic. Described from Dagestan (W. slope of Mt. Gotsala, on Keger plateau). Type in Leningrad.

A perfectly distinctive species, first collected by D. Bunakov in 1912, later collected on several occasions by A. Poretskii whose ample material has been used for the present description.

572 110. *Th. lipskyi* Klok. et Shost. in Tr. Bot. inst. AzFAN SSSR, II (1936) 308.

Subshrub; stems creeping, to 30 cm long, terminating in an assurgent sterile shoot; numerous decumbent ascending sterile shoots to 15 cm long arising from the stems; flowering branches erect or assurgent from base, 2–8 cm long, covered under the inflorescence and below with spreading hairs nearly equaling stem diameter or rarely shorter; leaves sessile, narrowly oblong-elliptical, (8) 9–11 (13) mm long, 1.25–2 mm broad, gradually narrowed toward base but without distinct petiole, ciliate to the middle or beyond, the surface glabrous or more rarely long-haired on both sides (f. *hirsutus* Klok. et Shost.); lateral veins prominent on lower side; glands rather indistinct; inflorescence capitate; floral leaves oblong-ovate, prominently veined; pedicels developed, short-haired; calyx tubular-campanulate, (4) 4.5–5.5 mm long in flower, long-haired below, subglabrous above; upper teeth lanceolate, the margin ciliate and minutely setiferous; corolla pale lilac (whitish in dry state), to 13 mm long. Fl. August–September.

Mountain slopes. — Caucasus: Cisc. Endemic. Described from Ciscaucasia (Bezengi). Type in Leningrad.

Note. Also a distinctive species, first collected in 1887 and 1889 by I. Ya. Akinfiev and later by Lipskii and Pastukhov. It has not been collected in more recent times. Described from Lipskii's specimens. The following locations, beside the classical, have been recorded: Nal'chik district, Kunim, Pelagiada near Voroshilovsk and village Sul'tanovskoe.

111. *Th. sosnowskyi* Grossh. in Izv. AzFAN SSSR, 10 (1944) 43.

Subshrub; stems terminating in a fertile shoot; sterile shoots arising from base of stems, trailing, to 20–30 cm long, slender, with dense short hairs, loosely leafed (internodes



- 10–15 mm long); flowering branches to 10 cm long, fairly stout, densely covered with rather long spreading hairs; leaves short-petioled, oblong-elliptical, 6–8 (10) mm long, 2–3 (4–5) mm broad, ciliate in lower third, the surface glabrous or with scattered long hairs; lateral veins 2 pairs, very prominent; glands numerous and distinct; inflorescence capitate, loose; pedicels rather long; calyx ca. 4 mm long, the upper teeth short-triangular, ciliate; corolla ca. 6 mm long, light rose-lilac, fine-haired outside. June–July.
- 573 Mountain slopes. — Caucasus: E. Transc. (S.). **Gen. distr.:** Turkey. Described from Georgia (Akhaltikh district, Yaila Tskal-Tbilo). Type in Tbilisi.

112. **Th. karjaginii** Grossh. in *Izv. AzFAN SSSR*, 10 (1944) 43.

A small subshrub; stems strongly lignified, terminating in a fertile shoot; trailing sterile shoots numerous, arising from stems or from rootstock; flowering branches erect, 2–5 cm long, with dense short hairs; leaves oblong-spatulate to almost obovate, 4–10 mm long, 2–4 mm broad, ciliate in lower part, the surface glabrous, with prominent veins and rather indistinct glands beneath, dull green, very rigid, often conduplicate; inflorescence compactly capitate; calyx narrowly campanulate, 4.5–5 mm long in flower, to 6 mm in fruit, with dense short hairs all round; upper teeth triangular, short, ciliate; corolla 6–7 mm long, bright pink. May–June.

Stony slopes and pebbles. — Caucasus: E. Transc. (Kabristan highland). Endemic. Described from Mt. Il'khi-Dag. Type in Baku.

113. **Th. moldavicus** Klok. et Shost. in *Bull. du Jard. Bot. de Kieff*, XVI (1932) 17 and in *Uch. zap. Khar'k. Gos. univ.* 14 (1938) 134. Klok. in *Vizn. rosl. URSS*, 427. — **Th. carnosulus** Dub. in *Fedch. and Fler. Fl. Evrop. Ross.* (1910) 834; Klok. and Shost. in *Tr. s.-g. bot.* I, 3, 123, non *Velen. Fl. bulg. suppl.* I, 240.

A small subshrub, densely cespitose; stems creeping, fairly stout, terminating in a fertile shoot; sterile shoots arising from stems and from the rootstock; flowering branches numerous, to 12 cm long, covered under the inflorescence and all along with short retrorse-appressed hairs; cauline leaves petiolate, oblong-elliptical, 5–10 (11) mm long, (1) 1.5–2 (2.5) mm broad, ciliate only to base of blade, the surface glabrous; lateral veins slightly prominent; glands numerous and large; inflorescence compactly capitate; calyx narrowly campanulate, 3–3.5 mm long, with short-haired tube; upper teeth sharply triangular, subequal, long-ciliate; corolla 6 mm long, bright lilac, the narrow tube to 3 mm long; nutlets short-ellipsoid, to 0.75 mm long. Fl. June–July.

Stony calcareous slopes. — European part: Bes. (S.), Bl. (W.), Crim. (Eupatoria district and Kerchenskii Peninsula). Endemic. Described from the lower reaches of Ingulets (in the vicinity of village Roksandrovka, Nikolaev Region, Ukr.SSR). Type deposited in Khar'kov; cotypes in Kiev.

- 574 114. **Th. pseudograniticus** Klok. et Shost. in *Tr. s.-g. bot.* I, 3 (1927) 124, and in *Uch. zap. Khar'k. Gos. univ.* 14 (1938) 135; Klok. in *Vizn. rosl. URSS*, 428.

Subshrub, cespitose; stems rather stout, terminating in a fertile shoot; trailing sterile shoots arising only from the stems; flowering branches (4) 5.5–11 cm long,

covered under the inflorescence with rather short spreading hairs; leaves short-petioled, narrowly linear-elliptical, 5–10.5 mm long, 0.75–1.25 (1.5) mm broad, rather firm, coriaceous, ciliate in lower third, with glabrous surface, the veins prominent beneath, the glands large, very distinct; inflorescence capitate, occasionally somewhat elongate and with a distant whorl; calyx narrowly campanulate, 2.75–3.5 mm long, hairy below, glabrous above; upper teeth sharply triangular, markedly unequal, rather sparsely long-ciliate; corolla 5.5–7 mm long, bright lilac; nutlets short-ellipsoid, 0.5–0.6 mm long; the whole plant strongly lemon-scented. July–August.

Granite outcrops. — European part: Bl. (E.). Endemic. Occurring only in the S. part of Stalino district, Ukr.SSR along river Kal'chik which flows into river Kal'mius\* near Zhdanov. Described from Kal'chik (between villages Staryi Krym and Chardakly). Type deposited in Khar'kov; cotypes in Kiev.

Note. This species had at first been considered to be of hybrid origin (Th. dimorphus Klok. et Shost. × Th. graniticus Klok. et Shost.) but the assumption was later refuted by the authors.

115. *Th. graniticus* Klok. et Shost. in Tr. s.-g. Bot. I, 3 (1927) 131 and in Uch. zap. Khar'k. Gos. univ. 14 (1938) 135; Klok. in Vizn. rosl. URSR, 428.

Subshrub, rather densely caespitose; stems slender, terminating in a fertile shoot; trailing sterile shoots arising from stems and from rootstock; the whole plant characteristically dark green; flowering branches somewhat ascending, 3–12 cm long, covered under the inflorescence with short retrorse-appressed hairs, arising from the stems in mostly regular rows; leaves narrowly linear-elliptical, 7–11 (12) mm long, 0.75–1.25 (1.5) mm broad, on fertile shoots sessile, on sterile shoots minutely petiolate, the margin with a few cilia at base, the surface glabrous; glands very distinct; lateral veins slightly prominent; inflorescence capitate, occasionally somewhat elongate and with 1 or 2 distant whorls; calyx tubular-campanulate, ca. 3.5 mm long, short-haired  
575 below, glabrous above; upper teeth sharply triangular, the margin with short setae, eciliate, the middle tooth markedly larger than the lateral teeth; corolla ca. 6.5 mm long, dark lilac, with a very narrow tube; nutlets oblong-ellipsoid, ca. 0.75 mm long, dark brown; the whole plant strongly lemon-scented. Fl. second half of June to first half of August.

Granite outcrops. — European part: Bl. (E.) Endemic. Described from river Kal'mius (near village Ignat'evka, Stalino region, Ukr.SSR). Type deposited in Khar'kov. Authentic specimens in Kiev.

Note. This species occurs only along the middle reaches of river Kal'mius, where the river cuts through the granite layer; it grows there in considerable concentration. *Th. graniticus* Klok. et Shost. is not to be found on granite outcrops along Kal'chik, a right tributary of the Kal'mius; it is replaced there by a closely related species, *Th. pseudograniticus* Klok. et Shost.

116. *Th. kalmiussicus* Klok. et Shost. in Bull. du Jard. Bot. de Kieff, XVI (1932) 18 ("kaljmijussicus") and in Uch. zap. Khar'k. Gos. univ. 14 (1938) 135; Klok. in Vizn. rosl. URSR, 428.

\* Not in Berda as incorrectly stated in our paper (1938).

Subshrub; stems terminating in a fertile shoot; trailing sterile shoots arising from stems and from rootstock; flowering branches erect, 2.5–6 (10) cm long, whitish with numerous short spreading hairs, usually densely leafy; leaves with very short but distinct petiole, narrowly linear-elliptical, (6) 7–10 (12) mm long, 0.75–1.5 (2) mm broad, with a few long cilia at base, densely covered on both sides (more densely beneath) with short spreading hairs, grayish; glands distinct; lateral veins slightly prominent beneath; inflorescence capitate; calyx 2.75–3.5 mm long, mostly ca. 3 mm long in flower, densely hairy all round; upper teeth sharply triangular, short, somewhat unequal, the margin with short setae and sparse cilia; corolla bright lilac; nutlets ellipsoid, ca. 0.75 mm long; the whole plant strongly lemon-scented. July.

Outcrops of Devonian sandstone. — European part: Bl. (E.). Endemic. Described from river Kal'mius (near village Bol'shaya Kara-Kuba, Stalino region, Ukr.SSR).

Note. So far known only from the classical site. The rarest of the three East Ukrainian granite endemics (the other two being *Th. graniticus* Klok. et Shost. and *Th. pseudograniticus* Klok. et Shost.).

117. *Th. calcareus* Klok. et Shost. in Tr. s.-g. bot. I, 3 (1927) 129 and in Uch. zap. Khar'k. Gos. univ. 14 (1938) 129; Klok. in Vizn. rosl. URSR, 428. — *Th. rariflorus* var. *calcareus* Ronn. in Fedde, Repert. XXXI (1932) 153.

576 Subshrub; stems terminating in a fertile shoot; trailing sterile shoots arising from stems; flowering branches erect or more often somewhat ascending, (3) 4–12 (14) cm long, covered under the inflorescence with short retrorse-appressed hairs; leaves distinctly petiolate, oblong-elliptical or linear-elliptical, (6) 8–13 (15) mm long, 1–2 (2.5) mm broad, with few cilia only at base, the surface glabrous; glands very distinct; veins slightly prominent; lowermost leaves on flowering branches small, elliptical, with a relatively long petiole; inflorescence capitate; calyx campanulate, 3.5–4 mm long, green; upper teeth triangular, subequal, the margin naked or with short setae, always eciliate; corolla to 7 mm long, rather dull lilac; nutlets ovoid-ellipsoid, ca. 1 mm long, dark brown. Fl. June–July.

Outcrops of carboniferous limestone, more rarely on chalk or shale. — European part: Bl. (along the river Molochnyaya and across a small pass to the east along the upper reaches of Kal'mius, along Mius and Donets), L. Don (lower and middle reaches of river Don). Endemic. As pointed out in our paper (1938), the distribution area of this species is broken up into three main parts. Described from river Kal'mius (village Beshevo, Stalino region, Ukr. SSR). Type deposited in Khar'kov; cotypes in Kiev and Leningrad.

Note. The proposal put forward by Ronniger (1932) to classify this species as a variety of the Iranian-East Transcaucasian *Th. rariflorus* C. Koch, is completely unfounded. It would also be unjustified to consider the other species of the group (*Th. cretaceus* Klok. et Shost., *Th. dubjanskyi* Klok. et Shost., *Th. kirgisorum* Dub.) as varieties of *Th. rariflorus* C. Koch, as they bear no direct relation whatsoever to the latter. The subject is thoroughly discussed in our paper "Chebretsy Evropeiskoi chasti SSSR" (Thymes of the European part of the U.S.S.R.) (1938).

*Th. calcareus* Klok. et Shost. forms crosses with *Th. dimorphus* Klok. et Shost.



118. *Th. cretaceus* Klok. et Shost. in Tr. s.-g. bot. I, 3 (1927) 127 and in Uch. zap. Khar'k. Gos. univ. 14 (1938) 137; Klok. in Vizn. rosl. URSR, 428. — *Th. cimicinus* auct. fl. Ross. non Blum. — *Th. rariflorus* var. *cretaceus* Ronn. in Fedde, Repert. XXXI (1932) 153.

Subshrub; stems decumbent but not rooting, irregularly branched, terminating in a fertile shoot; trailing sterile shoots arising from stems; flowering branches 2–10 cm long, covered under the inflorescence with very short undulate hairs; leaves petiolate, oblong-elliptical, 5–10 mm long, 1–2 (2.25) mm broad, rather thick, with margin ciliate in lower third, glabrous; veins and glands rather indistinct; lowermost leaves on 577 branches small, rounded-rhomboid, the petiole about as long as blade; inflorescence compactly capitate; calyx tubular-campanulate, 3.25–4 mm long, lilac, with narrow tube; upper teeth triangular, obtusish, the margin naked, rarely with short setae, always eciliate; corolla ca. 7 mm long, rather bright lilac; nutlets short-ellipsoid, ca. 0.75 mm long. June–July. (Plate XXXI, Figure 3.)

Chalk outcrops. — European part: M. Dnp. (extreme E.), V.-Don (S.W.), L. Don (N. half of the region). Endemic. Described from Donets (in the vicinity of Izyum, Khar'kov region, Ukr.SSR). Type in Kiev.

Note. This species is distributed only on chalk outcrops in the Don basin, but it does not extend to the northernmost chalks. It does not occur at all on the more chalky outcrops of the Dnieper basin (where the more distinctive eastern chalk flora is generally absent but, as recently discovered, local endemics make an appearance) nor is it to be found in easterly direction, in Volga and Ural basins. On the Volga chalks it is replaced by other species.

119. *Th. dubjanskii* Klok. et Shost. in Izv. Bot. sada, 3–4 (1931) 545 and in Uch. zap. Khar'k. Gos. univ. 14 (1938) 138. — *Th. rariflorus* var. *dubjanskii* Ronn. in Fedde, Repert. XXXI (1932) 153.

Subshrub, densely cespitose; stems stout, strongly lignified, terminating in a fertile shoot; trailing sterile shoots arising from stems; flowering branches erect, 2.5–10 (11) cm long, covered under the inflorescence with very short retrorse-appressed hairs, densely leafy, the internodes often much shorter than leaves; leaves short-petioled, oblong-elliptical, (7) 8–11 (12) mm long, 2–3 (4) mm broad, sparsely ciliate in lower third, glands rather indistinct; lateral veins slightly prominent; axillary fascicles well developed, especially on sterile shoots; inflorescence capitate, often branched (fertile shoots with flowering branches in the axils of upper leaves); calyx narrowly campanulate, 4–4.5 mm long, more or less intensely suffused with dark lilac (this imparting a characteristic coloring to the whole head); upper teeth sharply triangular, unequal, the margin eciliate, with isolated setae; corolla bright lilac. July to first half of August. (Plate XXXI, Figure 4.)

Chalk outcrops. — European part: V.-Don (Centr. Transvolga region). Endemic. Described from the Volga (vicinity of Khvalynsk). Type in Leningrad.

Note. A very characteristic species, differing markedly from the more westerly *Th. cretaceus* Klok. et Shost. Growing abundantly at margins and in openings of 578 pine woods on chalks between Vol'sk and Khvalynsk. Crosses between this species and *Th. marschallianus* Willd. are known.

Series 2. *Hadzhieviani* Klok. — Trailing sterile shoots absent; leaves sessile, narrow, ciliate nearly to apex; inflorescence elongate-capitate, often interrupted; upper teeth eciliate.

This series consists of a single East Transcaucasian species and its taxonomic position is not sufficiently clear.

120. *Th. hadzhievii* Grossh. in Izv. AzFAN SSSR, 10 (1944) 44.

Subshrub; stems slender, terminating in a fertile shoot; trailing sterile shoots absent; flowering branches arising from stems in regular rows, erect, 8–15 cm long, densely covered all along with short spreading hairs; basal leaves (at base of branches) oblong, small, 2–2.5 mm long; cauline leaves oblong-elliptical to linear-elliptical, 7–10 mm long, 1.5–2 mm broad, without distinct petiole, with margin ciliate to apex, glabrous, the veins slightly prominent, the glands rather indistinct; inflorescence elongate-capitate, oblong-ovoid, 1–3 cm long, often interrupted in lower part; floral leaves ovate-rhomboid; pedicels distinct, short-haired; calyx tubular-campanulate, ca. 5 mm long, short-haired; upper teeth triangular-lanceolate, eciliate; corolla ca. 7 mm long, light lilac. June–July.

Mountain slopes. — Caucasus: E. Transc. **Gen. distr.:** probably endemic. Described from Azerbaidzhan (Shemakha district, Kizil-Dak gorge, near village Astrakhanka). Type in Baku.

Series 3. *Humillimi* Klok. et Shost. in Uch. zap. Khar'k. Gos. univ. 6–7 (1936) 291 and 14 (1938) 138. — Subshrubs; stems elongated, terminating in a sterile shoot; flowering branches very short; leaves sessile, very narrow, linear-spatulate, channeled each side of midvein or revolute-margined, the length/width index 14–20. *Th. majkopensis* Klok. et Shost., whose taxonomic position is somewhat uncertain, has flat leaves.

East Mediterranean xeromorphic upland species, occurring in the U.S.S.R. only in the mountainous part of Crimea, in the Novorossiisk district and in N.W. Ciscaucasia.

121. *Th. pseudohumillimus* Klok. et Shost. in Tr. Bot. inst. AN SSSR, V, 2 (1936) 287 and in Uch. zap. Khar'k. Gos. univ. 14 (1938) 138. — *Th. humillimus* auct. fl. 579 taur. pro parte non Celak. — *Th. humillimus* var. *hirsuta* Janata in schedis ex Klok. et Shost. l. c. — *Th. boissieri* H. Braun in Zelenetskii, Mat. dlya fl. Kryma (1906) 34, non Halasey. — *Th. striatus* H. Braun in Zelenetskii, op. cit. non Vahl.

Subshrub, forming very dense, often depressed-pulvinate mats; the whole plant grayish with dense hairs of varying length; stems long, rather stout, terminating in a trailing sterile shoot and bearing decumbent sterile lateral shoots; flowering branches assurgent or erect, 1.5–3 (4) cm long, covered under the inflorescence with retrorse-appressed short hairs; leaves sessile, narrowly linear-spatulate, 5–10 (11) mm long, 0.25–0.75 mm broad, with margin ciliate except at the very apex, covered on both sides with dense long and short hairs; midvein very pronounced on the lower side, thick,

occupying nearly half the width of blade, longitudinally channeled on each side of midvein, the channels particularly conspicuous in dry material; glands rather indistinct; heterophylly slightly developed, some lower leaves having a distinct petiole and somewhat dilated blade; inflorescence capitate; floral leaves lanceolate; pedicels very short; calyx tubular-campanulate, (2.75) 3–3.5 mm long in flower, to 4–4.5 mm in fruit, hairy all round, green or lilac; upper teeth ciliate, the cilia sometimes very sparse; corolla lilac; nutlets globose, ca. 0.6 mm in diameter. Fl. July–August.

Stony slopes. — European part: Crimea (mountainous part, mainly on the yaila). Endemic. Described from Nikitskaya yaila, above Gurzuf saddle. Type deposited in Khar'kov.

Note. The Anatolian species *Th. humillimus* Celak. is clearly distinguishable from the Crimean by the indument, which imparts to the plant a whitish coloring, and the revolute leaf margins.

*Th. pseudohumillimus* Klok. produces crosses with *Th. callieri* Borb.

122. *Th. tauricus* Klok. et Shost. in Tr. Bot. inst. AN SSSR, I, 2 (1936) 289 and in Uch. zap. Khar'k. Gos. univ. 14 (1938) 139. — *Th. humillimus* auct. fl. taur. pro parte non Celak. — *Th. odoratissimus* auct. fl. taur. non M. B. — *Th. humillimus* var. *genuina* Janata in schedis ex Klok. et Shost. l. c.

Subshrub, forming dense, compact mats; stems long, rather stout, terminating in a sterile shoot; flowering branches 1.5–6 cm long, covered under the inflorescence and lower down with short recurved hairs, nearer the base with a cluster of even shorter retrorse-appressed hairs; leaves sessile, narrowly linear-spatulate, (4.5) 5–11 mm long, 0.25–0.75 mm broad, broadest in upper third, ciliate to the middle and beyond the surface covered with minute bristles (visible only with a magnifying glass) but hairless, the lower side channeled beneath on each side of the very prominent midvein; inflorescence capitate, subtended by lanceolate leaves; pedicels very short; calyx tubular-campanulate, (3) 3.25–4.25 mm long in flower, 4–5.25 mm in fruit, usually lilac, glabrous in upper part; upper teeth eciliate; corolla lilac. Fl. second half of June to July.

Stony slopes. — European part: Crimea (mountainous part, mainly on the yaila). Endemic. Described from Yalta region (yaila above Kikenez). Type deposited in Khar'kov.

123. *Th. helendzhicus* Klok. et Shost. in Tr. Bot. inst. AzFAN SSSR, II (1936) 309. — *Th. humillimus* auct. fl. Cauc. non Celak.

Subshrub; stems creeping, terminating in a trailing or distally ascending sterile shoot; flowering branches erect or ascending at base, 2.5–8 cm long, covered with short spreading hairs; leaves sessile, somewhat clasping at base, narrowly linear, (6.5) 7–10 mm long, 0.5–0.7 (0.75) mm broad, long-ciliate to three-quarters length of blade, with glabrous surface (without hairs or bristles but with minute papillae), the lower side channeled on each side of the prominent midvein; glands few, hardly discernible; inflorescence compactly capitate; floral leaves broadly lanceolate, short-cuneate at base; pedicels very short; calyx 3.5–4.25 mm long in flower, the margin of upper teeth with cilia and short setae; corolla lilac, ca. 6 mm long. July. (Plate XXXI, Figure 5.)



Limestone outcrops on the sea coast. — Caucasus: W. Transc. (Novorossiisk district). Endemic. Described from Gelendzhik. Type in Leningrad.

124. *Th. majkopensis* Klok. et Shost. in Tr. Bot. inst. AzFAN SSSR, II (1936) 309.

Subshrub; stems slender, terminating in a sterile or fertile shoot; flowering branches arising from stems in regular rows, erect, 1–2.5 cm long, covered under the inflorescence with rather short hairs (half stem diameter); leaves ciliate nearly to apex, with 581 glabrous surface, prominent midvein and indistinct glands, the lower narrowly spatulate, slightly clasping, ca. 2.5 mm long and 0.5 mm broad, the upper sublinear, to 8 mm long and 0.5 mm broad; inflorescence capitate; floral leaves broadly lanceolate, obtuse, with rather dense hairs beneath (especially at base), glabrous above; pedicels very short; calyx narrowly campanulate, 3.25–3.75 mm long in flower, to 5 mm in fruit, hairy below, subglabrous above; upper teeth ciliate; corolla ca. 5 mm long, lilac; nutlets subglobose, ca. 0.5 mm in diameter. July–August.

Dry stony slopes, rocks. — Caucasus: Cisc. (W.). Endemic. Described from the Maikop district (Mt. Oshtena). Type in Kiev.

Series 4. *Odoratissimi* Klok. — Pallasiani Klok. et Shost. in Uch. zap. Khar'k. Gos. univ. 6–7 (1936) 292 and 14 (1938) 139, pro parte. — Relatively large subshrubs; stems rather short and stout, terminating in a fertile shoot; flowering branches to 15–20 cm long, covered under the inflorescence with short retrorse-appressed hairs; leaves sessile, narrowly linear-acicular with revolute margins or narrowly linear-spatulate, ciliate to the middle or higher up; upper calyx-teeth eciliate.

Exclusively psammophilous plants, confined to the steppe regions or the European part of the U.S.S.R.

125. *Th. borysthenicus* Klok. et Shost. in Tr. s.-g. bot. I, 3 (1927) 135 and in Uch. zap. Khar'k. Gos. univ. 14 (1938) 139.

Subshrub; stems rather short, stout, terminating in a fertile shoot and bearing trailing sterile shoots; flowering branches assurgent or erect, (3) 5–15 cm long, covered under the inflorescence and all along with short retrorsely appressed hairs, densely leafy, often branched, with axillary fascicles in most leaf axils; leaves sessile, narrowly linear-acicular, (4) 5–9 (12) mm long, ca. 0.5 mm broad, revolute-margined, ciliate to the middle or beyond, the surface glabrous but not smooth (covered on both sides with minute bristles), the glands very distinct, the veins rather indistinct; inflorescence compactly capitate; calyx narrowly campanulate, ca. 3.5 mm long in flower, 4–4.75 mm in fruit, usually dark lilac or lilac, short-haired below, glabrous above; upper teeth lanceolate, acute, subequal, the margin naked or minutely setiferous but not ciliate; corolla 6–7 mm long, with a short tube, bright lilac; nutlets short-ellipsoid, ca. 1 mm long. June–August. (Plate XXX, Figure 1.)

582 Lower Dnieper sands. — European part: Bl. Endemic. Described from Lower Dnieper (Kazach'i Lageri). Type deposited in Khar'kov; cotypes in Kiev and Leningrad.



PLATE XXXI. 1 – *Thymus borysthenticus* Klok. et Shost., plant fragment, leaf, calyx; 2 – *Th. pallasianus* H. Braun, branchlet, leaf; 3 – *Th. cretaceus* Klok. et Shost., plant fragment, leaf, calyx; 4 – *Th. dubjanskii* Klok. et Shost., plant fragment, leaf, calyx; 5 – *Th. helendzhicus* Klok. et Shost., general aspect, leaf, calyx.

126. *Th. pallasianus* H. Braun sec. Ronn. in Fedde, Repert. XXXI (1932) 148; Klok. and Shost. in Uch. zap. Khar'k. Gos. univ. 14, 140; Klok. in Vizn. rosl. URSS, 429. — *Th. odoratissimus* M. B. Fl. taur.-cauc. III (1819) 405; Klok. and Shost. in Tr. s.-g. bot. I, 3, 131; in Fl. Yugo-Vost. VI, 178, non Mill. (1768).

Subshrub; stems rather stout, terminating in a fertile shoot; trailing sterile shoots mostly few, rather short, arising from stems; flowering branches 5–20 cm long, covered under the inflorescence with short retrorse-appressed hairs, densely leafy, often branched, most leaves nearly always with axillary fascicles; leaves sessile, narrowly linear-spatulate, (6) 8–12 (16) mm long, (0.5) 0.75–1.5 (2) mm broad, broadest near apex, ciliate to the middle or mostly somewhat higher up, glabrous, with distinct glands and rather indistinct veins; inflorescence compactly capitate; calyx narrowly campanulate, 3.5–4 mm long, lilac; upper teeth sharply triangular, subequal, the narrowly scarious margin naked or more rarely with short setae, eciliate; corolla ca. 7 mm long, with a short tube, bright lilac; nutlets short-ellipsoid, compressed at base, to 1.25 mm long, finely foveolate. June–July. (Plate XXXI, Figure 2.)

Riverside sands. — European part: M. Dnp., V.-Don (S. part of the region), Bl., L. Don, Transv. (W.), L. V.; Caucasus: Cisc. (Sulak), Dag. (N.), W. Transc. (Novorossiisk area). Endemic.

Note. Within the confines of its distribution area, this species is completely absent in the Lower Dnieper region where it is replaced by *Th. borysthenticus* Klok. et Shost. We consider the latter to be the more ancient, ancestral form. This assumption would seem to be supported by the fact that the cells of *Th. borysthenticus* contain fewer chromosomes than those of *Th. pallasianus* (data supplied by P. F. Oksiyuk).

585 *Th. pallasianus* hybridizes with *Th. czernjaevii* Klok. et Shost., more rarely with other species (*Th. marschallianus* Willd., *Th. dimorphus* Klok. et Shost., *Th. kirgisorum* Dub.).

Series 5. *Eremitae* Klok. — *Pallasiani* Klok. et Shost. in Uch. zap. Khar'k. Gos. univ. 6–7 (1936) 292 and 14 (1938) 139, ex parte. — Stems terminating in a fertile shoot; trailing sterile shoots arising from stems; stems covered with mostly short recurved hairs; middle cauline leaves oblong-elliptical, 1–6 mm broad, short-petioled or sometimes sessile, ciliate only in lower part; upper calyx-teeth eciliate (except one species with hairy leaves); corolla rarely bright-colored.

Eastern series of the section. Asian species, distributed in the steppe and semi-desert regions from Transvolga to Dauria.

127. *Th. lanulosus* Klok. et Shost. in Zhurn. Inst. bot. AN USSR, 9/17 (1936) 195 and in Uch. zap. Khar'k. Gos. univ. 14 (1938) 143. — *lc.*: Klok. and Shost. op. cit. (1936) Fig. 6.

Subshrub; stems rather stout, terminating in a fertile shoot; trailing sterile shoots arising from stems; whole plant whitish with rather short (multicellular) hairs; flowering branches 2–8 cm long, covered under the inflorescence with recurved hairs; leaves sessile, oblong, 8–13 mm long, 1–2 mm broad, with scarcely revolute margins, covered



on both sides with spreading and subappressed hairs, the glands distinct, the veins rather prominent beneath; inflorescence capitate; calyx campanulate, 3–3.5 mm long in flower, to 4 mm in fruit, hairy all round, the upper teeth ciliate; corolla pale lilac; nutlets oblong-ellipsoid, ca. 0.9 mm long and 0.6 mm broad, light brown. June–July.

Dry steppes. — European part: L. V. (Krasnoarmeisk), Transv. (Obshchii Syrt). Endemic. Described from the Transvolga region. Type in Leningrad.

Note. An interesting form, with indument quite uncharacteristic of the group as a whole.

128. *Th. kirgisorum* Dub. in O. and B. Fedch. Perech. rast. Turk. V (1913) 128; Klok. and Shost. in Izv. Bot. sada, XXX, 3–4, 539 and in Uch. zap. Khar'k. Gos. univ. 14, 141. — *Th. rariflorus* var. *kirgisorum* Ronn. in Fedde, Repert. XXXI (1932) 153.

Subshrub; stems long, terminating in a fertile shoot; sterile shoots arising from stems, assurgent; flowering branches erect, 3–15 (17) cm long, covered all along with 586 short retrorse-appressed hairs, flesh-colored under the indument, densely leafy; leaves yellowish-green, oblong-elliptical, 5–15 (18) mm long, (1) 1.5–3 (3.5) mm broad, short-ciliate in lower quarter, glabrous, with rather indistinct glands and on lower side with slightly prominent veins, coriaceous, on fertile shoots sessile or nearly so, on sterile shoots rather indistinctly petiolate; inflorescence capitate; calyx narrowly campanulate, 3.5–4 mm long; upper teeth eciliate, the margin smooth or minutely setiferous; corolla pink; nutlets oblong-ellipsoid, ca. 0.75 mm long, dark brown. Second half of June to first half of July.

Steppe slopes and ravines, outcrops of calcareous rock. — European part: Transv., L. V.; W. Siberia: U. Tob. (S. W.); Centr. Asia: Ar.-Casp. (N.). Endemic. Described from the River Emba. Type in Leningrad.

Note. A form of this species, associated with chalk, differs rather markedly from the common steppe form in having shorter flowering branches (3–4 cm) and comparatively small leaves (5–10 mm long and 1.5–2 mm broad). It has been described as a distinct variety, *Th. kirgisorum* var. *creticola* Klok. et Shost. (1931) or as a subspecies, ssp. *creticola* Klok. et Shost. (1938) from chalk outcrops on the right bank of Lower Volga, whence the typical form is unknown. S. S. Stankov proposed specific status for this form in "Opredelitel'" (1949): *Th. creticola* (Klok. et Shost.) Stank.

129. *Th. kasakstanicus* Klok. et Shost. in Izv. Bot. sada, XXX, 3–4 (1931) 539. — *Th. kirgisorum* ssp. *kasakstanicus* Klok. et Shost. in Uch. zap. Khar'k. Gos. univ. 14 (1938) 142.

Similar to *Th. kirgisorum* Dub., but producing denser growth, caespitose; flowering branches 4–7 cm long, short-haired, greenish; leaves light green, sessile, mostly oblong-elliptical to sublinear (the upper), 8–14 (15) mm long, 1–2 (2.5) mm broad, ciliate only at base, with glabrous surface, somewhat indistinct glands and slightly prominent lateral veins; lowermost rameal leaves small, with petiole nearly as long as the broadly elliptical blade; inflorescence capitate; pedicels one-half to two-thirds the length of calyx;

calyx narrowly campanulate, 3.5–4 mm long; upper teeth sharply triangular, the margin eciliate, with short setae; corolla dark lilac; nutlets ellipsoid. June–July.

Steppes, crystalline rock outcrops. — Centr. Asia: Ar.-Casp. Endemic. Described from W. Kazakhstan. Type in Leningrad.

130. *Th. eremita* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

587 Subshrub; stems fairly stout or slender, terminating in a fertile shoot; sterile shoots trailing or ascending at the tips, arising from stems, 2–5 cm long; flowering branches 1.5–4 cm long, lilac, rather sparsely covered with short recurved hairs; shorter branches more densely hairy; leaves short-petioled, oblong-elliptical, only occasionally oblong-ovate or obovate, 2.5–11 mm long, 1–2.5 (3) mm broad, with length/width index 2.5–6, in lower third with few cilia to 1.5 mm long; lateral veins 2 to 4 (mostly 3) pairs, rather slender; glands rather indistinct; basal leaves small, obscurely petiolate; leaves of sterile shoots often inequilateral; inflorescence compactly capitate; calyx narrowly campanulate, 4–4.5 mm long in flower, more or less suffused with dark lilac; upper teeth lanceolate, subobtusate, eciliate; corolla 6–7 mm long, rather dull rose-lilac. June.

Stony slopes, rocks. — Centr. Asia: Balkh. Endemic. Described from Mt. Chingar. Type in Kiev.

Note. This species has been described from plants collected by N. V. Shipchinskii (expedition to the Semipalatinsk District, 1914) and for some reason preserved in Kiev. We have not so far come across any doubles in Leningrad. The plant is apparently most closely related to *Th. kirgisorum* Dub. and represents its eastern vicariat.

131. *Th. eltonicus* Klok. et Shost. in Izv. Bot. sada, XXX, 3–4 (1931) 543 and in Uch. zap. Khar'k. Gos. univ. 14. (1938) 143.

Subshrub; stems terminating in a fertile shoot; trailing sterile shoots arising from stems; flowering branches 6–15 cm long, covered under the inflorescence with short retrorse-appressed hairs; leaves short-petioled, oblong-elliptical, (9) 12–17 (20) mm long, (2) 2.5–5 (6) mm broad, with margin sparsely ciliate at base, glabrous, the glands and veins rather indistinct; inflorescence capitate or sometimes somewhat elongate; pedicels shorter than to as long as calyx; calyx narrowly campanulate, 4–4.5 mm long in flower; upper teeth with short setae, eciliate; corolla rather dull lilac-rose; nutlets short-ellipsoid. June–July.

On clayey soil, in gullies and ravines in semideserts. — European part: L. V.; Centr. Asia: Ar.-Casp. Endemic. Described from the shores of Lake El'ton. Type in Saratov.

Note. The species was described from plants collected by L. I. Kazakevich who was also the first to draw attention to its distinctiveness (in the paper "Dikorastushchie dushistyie rasteniya Nizhnego Povolzh'ya i ikh efirnye masla" (Wild-growing fragrant plants of Lower Volga region and their essential oils) (1928).

588 132. *Th. incertus* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems terminating in a fertile shoot; strongly developed, trailing sterile shoots, to 10 cm long, arising from stems or from rootstock; flowering branches

4–8 cm long, covered under the inflorescence with retrorse hairs much shorter than stem diameter and lower down with shorter recurved hairs, densely leafy; leaves short-petioled, oblong-lanceolate or oblong-elliptical, 7–20 mm long, 1.5–4 mm broad, with length/width ratio 4–8, with isolated short cilia or eciliate, the surface glabrous; venation camptodromous; lateral veins 3 or 4 pairs, prominent beneath; glands copious, very distinct; leaves of sterile shoots upright and obliquely curved; lower floral leaves ovate-lanceolate or triangular; middle cauline leaves 2–2½ times as long as internodes, often with axillary fascicles; inflorescence capitate, rather compact; pedicels 2–2.5 mm long, short-haired; calyx tubular-campanulate, 3.5–4 mm long in flower, to 5.5 mm in fruit, hairy in lower part, glabrous above; upper teeth lanceolate, short, very unequal (the middle tooth twice as long as the lateral teeth), the margin rough but quite naked, without cilia or setae; corolla slightly exceeding the calyx (not more than one-and-a-half times as long), lilac-rose; nutlets ellipsoid, ca. 1 mm long, nearly black, somewhat lustrous, June.

Stony slopes. — Centr. Asia: Syr D. Endemic. Described from the territory of former Namangan uezd. Type in Leningrad.

Note. A quite distinctive form that has very little in common with other Central Asian species and generally with a rather undetermined position in the system. In habit, most closely resembling the *S. Ukrainian Th. dimorphus* Klok. et Shost. although undoubtedly belonging to another taxonomic group.

133. *Th. cuneatus* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems terminating in a fertile shoot; sterile shoots arising from stems, trailing; flowering branches erect or assurgent at the very base, 10–15 cm long, covered under the inflorescence with moderately long or short recurved hairs, shorter and sparser toward base of branch; basal leaves small, ca. 3 mm long and 0.75 mm broad; cauline leaves oblong-ovate, cuneate at base, narrowed to a short but distinct petiole, 589 together with petiole 9–11 mm long, 1.5–6 mm broad, rather firm, with 1 or 2 cilia on either side, the surface glabrous; lateral veins 3 or 4 pairs, rather slender but prominent; glands distinct; inflorescence capitate, sometimes with a depauperate distant whorl, often branched (with flowering branches in the axils of middle leaves); pedicels 2–3 mm long, short-haired; calyx campanulate, 4–5 mm long, the tube short-haired, the upper lip glabrous outside; upper teeth lanceolate, acuminate, the margin obscurely setiferous, often only at apex, eciliate; corolla nearly one-and-a-half times as long as calyx, pale (probably pink). June–July.

Dry mountain slopes. — Centr. Asia: T. Sh. Endemic. Described from Tashkent Alatau. Type in Leningrad.

134. *Th. irtyschensis* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems slender, terminating in a fertile shoot; sterile shoots arising from stems, trailing; flowering branches assurgent, 7–12 cm long, covered under the inflorescence with recurved or subappressed short hairs (markedly less than stem diameter), dark lilac, with elongated internodes; leaves petiolate, mostly oblong-elliptical, sometimes oblong-obovate, the lower also obovate or oval, 4–15 mm long, 1.5–4 mm



broad, cuneate at base, gradually narrowed to petiole to 5 mm long, the length/width index 2.3–6, the margin with few long cilia in lower third, the surface glabrous; venation camptodromous; lateral veins 2 to 4 (mostly 3) pairs, slightly prominent, rather slender; glands small but rather distinct; basal leaves small, short-petioled; lower to middle leaves with petiole nearly length of blade; upper and floral leaves short-petioled; middle cauline leaves one-third to one-half the length of internodes; inflorescence capitate, often with a depauperate distant whorl; pedicels to 2–3 mm long, covered with very short retrorse-subappressed hairs; calyx tubular-campanulate, 4–4.5 mm long, the tube covered with very short hairs; upper teeth lanceolate, the margin naked or almost smooth; corolla of hermaphrodite flowers 6–7 mm long, rather dull rose-lilac. July.

Mountain slopes, (at altitudes between 900 and 1500 m). W. Siberia: Alt. Probably endemic. Described from Altai (Vostochnaya Kolba near interfluvium with river Bukon'). Type in Kiev.

Note. This species has been described from plants collected during the Altai expedition of V. Reznichenko (1912–1913), preserved in the general herbarium of the 590 Botanical Institute of the Academy of Sciences of the USSR in Kiev, so far little used.

135. *Th. nerczensis* Klok. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Subshrub; stems slender, branched, the main ramifications terminating in a fertile or sterile shoot; terminal sterile shoots to 12 cm long; flowering branches 3–5 cm long, slender, covered under the inflorescence with recurved hairs equaling branch diameter, lilac or dark lilac; leaves narrow, oblong-elliptical or linear-elliptical, sessile or with a very short petiole, 3–12 mm long, 0.7–2 mm broad, the margin with few cilia at base (not extending beyond one-quarter of leaf length), the surface glabrous; lateral veins 2 pairs, scarcely discernible; glands fairly distinct; basal leaves small, sessile, appressed to branch base; cauline leaves mostly sessile, to 7 mm long, 1 mm broad; leaves of sterile shoots larger than the cauline, usually distinctly petiolate, often inequilateral and obliquely curved; inflorescence capitate; pedicels to 2–2.5 mm long, short-haired; calyx narrowly campanulate, 4 mm long, hairy below, glabrous above, lilac or green; upper teeth with short setae at margin, eciliate, all lanceolate or the middle tooth sharply triangular, the lateral teeth smaller and relatively narrower, slightly convergent at apex; corolla lilac-purple, to 6 mm long; all parts camphor-scented. July–August.

Stony slopes. — E. Siberia: Dau. Gen. distr.: N. Mong. Described from the shores of River Nercha. Type in Leningrad.

136. *Th. petraeus* Serg. in Animadv. Syst. ex Herb. Univ. Tomsk. 2 (1937) 5 and in Kryn. Fl. Zap. Sib. IX (1937) 2390.

Subshrub; stems rather stout, to 5 mm in diameter, branched, terminating in a fertile shoot; sterile shoots arising from stems, densely leafy; flowering branches 1–6 cm long, often branched, covered with short recurved hairs; leaves short-petioled, mostly oblong-elliptical, 4–8 mm long, 1–1.5 (2) mm broad, ciliate only to base of blade, the surface glabrous; veins slightly prominent; glands distinct; inflorescence

capitate; calyx 2.5–3 mm long, lilac, hairy below, glabrous above; upper teeth ciliate; corolla ca. 4 mm long, pink; nutlets ellipsoid, ca. 0.75 mm long. July–August.

Mountain steppes. — W. Siberia: Irt. (S. E.), Alt. (S. W.); Centr. Asia: Balkh. (N.). Endemic. Described from Altai. Type in Tomsk.

Note. The position of this species is not quite clear to us. It may prove to be a hybrid form or it may possibly include such forms.

- 591 Subtribe D. Menthinae Briq. in Pflanzenfam. IV, 3a (1895) 208 et 316. — Calyx campanulate, infundibular or tubular, mostly with 5 equal or rarely unequal teeth or bilabiate, (5) 10–13-nerved; corolla almost regular, 4- or 5-lobed, the lobes flat; stamens 4, divergent from base, straight, subequal; herbs (in USSR), rarely shrubs.

Genus 1300.\* *Lycopus*\*\* L.

L. Sp. pl. (1753) 21

Calyx campanulate, almost regular, 4- or 5-toothed, naked inside; corolla equaling or somewhat exceeding calyx, campanulate, with 4 subequal lobes, hairy at base of stamens; stamens 4, the lower fertile, slightly exserted; nutlets flattened, trigonous, with thickened margin. Perennial herbs. The genus contains about twelve species.

- 1. Calyx-teeth obtuse; leaves obovate, with rounded teeth; nutlets longer than calyx . . . . . 2.
- + Calyx-teeth aristate, acute; leaves lanceolate, sharply incised; nutlets shorter than calyx . . . . . 3.
- 2. Flowers in compact many-flowered verticillasters; rhizome tuberous, fusiformly thickened; stolons numerous, filiform, leafy, often as long as the whole plant; leaves green on both sides; plants 15–45 cm high . . . . . 1. *L. parviflorus* Maxim.
- + Flowers few, in small loose verticillasters, often abortive; rhizome short, slightly thickened; stolons much shorter, filiform, often obsolescent; leaves often reddish beneath; plants 10–35 cm high . . . . . 2. *L. uniflorus* Michx.
- 3. All leaves pinnatipartite nearly to base, the segments large, acute, often indented . . . . . 3. *L. exaltatus* L. fil.
- + Leaves dentate- or serrate-incised, sometimes only the lower deeply incised to almost pinnatifid . . . . . 4.
- 4. All leaves alike, arcuate, unguiformly serrate . . . . . 4. *L. lucidus* Turcz.
- + Upper leaves dentate or almost entire, the lower deeply incised . . . . . 5.
- 5. Leaves narrowly lanceolate, the upper almost entire, the lower deeply incised . . . . . 5. *L. maackianus* (Maxim.) Makino.
- 592 + Leaves broadly lanceolate, the upper coarsely dentate, the lower often deeply incised; corolla shorter than to as long as calyx . . . . . 6.

\* Treatment by E. V. Volkova.  
\*\* From Greek *lykos*, wolf, and *pous*, foot.

6. Leaves glabrous or with few strict hairs, the floral linear-subulate, greatly exceeding calyx . . . . . 6. *L. europaeus* L.  
 + Leaves rather copiously covered on both sides with short crisp hairs, the floral aristate, few, shorter than calyx . . . . . 7. *L. hirtellus* Kom.

1. *L. parviflorus* Maxim. Prim. Fl. Amur. (1859) 216; Kom. Fl. Man'chzh. II, 382. — *L. virginicus* Herder in Bull. Soc. Nat. Mosc. LXI, 7 (1885) 132, ex pte, non L.

Perennial; rhizome fusiform, thickened; stolons arising at base of plant creeping, filiform, leafy; stem 15–40 cm long, simple, more rarely with few very slender lateral branches, 4-angled, densely covered with very short crisp hairs; leaves oblong-elliptical, gradually cuneate-attenuate at base, acuminate at apex, sharply dentate, sparsely covered (mainly beneath) with yellowish-golden punctate glands; flowers few, in small verticillasters; bracts 2 or 3, linear-lanceolate, not exceeding the flower, ciliate; calyx ca. 1 mm long, broadly campanulate, 5-toothed to one-third its length; calyx-tube ca. 1 mm long, the teeth obtusish, ciliate, equal except one smaller tooth; corolla white, 4-lobed, ca. 2 mm long, the tube 1 mm long, the lobes 0.8 mm long, sparingly short-ciliate; stamens scarcely exserted; nutlets 1 mm long, trigonous-obovoid, truncate, toothed at summit, glandular. July–August.

River banks, wet glades, flood-meadow thickets. — Far East: Uss., Sakh. **Gen. distr.:** China (Manchuria), Japan. Described from Amur. Type in Leningrad.

2. *L. uniflorus* Michx. Fl. Bor. Amer. I (1803) 14; Hultèn, Fl. Kamtch. IV, 93, excl. syn. *L. parviflorus* Michx. — *L. parviflorus* Kom. Fl. Kamch. III (1930) 16, non Maxim.

Perennial; rhizome branched, filiform, slender, flexuous; root with oblong or spherical tubers; stems 10–35 cm long, 4-angled, glabrous; leaves ovate-rhomboid or oblong-elliptical, 3–5 (6) cm long, 2.5–3 cm broad, gradually narrowed at base, obtusely toothed to crenate, rarely almost entire, glabrous on both sides, profusely punctate-glandular, often somewhat reddish beneath; flowers to 2 mm long, in loose few-  
 593 flowered semiverticels, with very small rudimentary, often obsolescent, flowers at the base of the axillary flower; calyx unequally 5-toothed, more rarely 4-toothed, glandular, 1.8 mm long, the tube 0.5 mm long; calyx-teeth obtuse, the margin densely beset with short cilia; corolla 4-lobed, the lobes unequal, one of them broader; stamens included in or equaling the corolla; nutlets 4-angled, truncate-obovoid, with coarsely toothed margin, 1.2 mm long, 0.5 mm broad, glandular. July–August.

River valleys, near hot springs. — Far East: Kamch. **Gen. distr.:** N. Am. Described from N. America. Type in London.

3. *L. exaltatus* L. fil. Suppl. (1781) 87; Ldb. Fl. Ross. III, 342; Shmal'g. Fl. II, 306; Grossg. Fl. Kavk. II, 347; Kryl. Fl. Zap. Sib. IX, 2294. — *L. pinnatifidus* Pall. Reise, III (1776) 665, nomen. — Ic.: Fl. Yugo-Vost. VI, 179, Fig. 619; Syreishch. Fl. Mosk. gub. III, 75.

Perennial; rhizome thickened, oblique, sometimes with long creeping stolons; stem 50–100 cm long, 4-angled, erect, simple, rarely branched, sparsely covered in upper



part with subappressed hairs and scattered small glands; leaves oblong-ovate, short-petioled or sessile, deeply pinnatisect (sometimes nearly to midvein), with lanceolate or oblong-lanceolate, mucronate, entire or few-toothed segments, 5–10 cm long, 2–7 cm broad, punctate-glandular, glabrous or short-haired above, the veins (especially the midvein) covered with rather long hairs; flowers numerous, in compact, 15–20-flowered whorls; bracts, especially the outer, mostly exceeding the whorls, lance-subulate, rigid, hispid; calyx campanulate, 5-toothed, 3.5–4 mm long, glandular, the teeth 3-nerved, the middle tooth conspicuous, aristate; corolla white, 3.5 (4) mm long, 4-lobed, cut to one-third into unequal lobes, the upper lobe slightly emarginate, the lower purple-speckled; stamens exerted one-third their length; nutlets 1 mm long, glandular above, with thickened margins. June–August.

Sand and pebble shallows and shores of river and lakes, wood margins, riverside thickets, inundated forests and canals. — European part: U. V., V.-Don, V.-Kama, Transv., L. Don, L. V., M. Dnp., U. Dnp., Bes., Bl., Crimea; Caucasus: Dag., W. and E. Transc.; W. Siberia: U. Tob. (W.), Ob, Alt., Irt.; E. Siberia: Ang.-Say.; Centr. Asia: Dzu.-Tarb., Balkh., Ar.-Casp., T. Sh. **Gen. distr.:** Centr. and S. Eur. Described from Italy. Type in London.

4. *L. lucidus* Turcz. in Bull. Soc. Nat. Mosc. XXIV (1851) 367; Ldb. Fl. Ross. 594 III, 341; Korzh. in Tr. Bot. sada, XII, 376, ex pte, excl. var. *maackianus*; Kom. Fl. Man'chzh. III, 379; Kom. and Alis. Opred. rast. Dal'nevost. kr. II, 909. — *L. lucidus* var. *hirtus* Rgl. in Mém. Acad. Sc. Pétersb. VII sér. IV (1862) 115; Korzh. op. cit.

Perennial; rhizome nodose, sometimes to 11–12 mm in diameter; stolons slenderly stringlike, rooting at nodes, dark brown, leafless; stem 40–80 (100) cm long, erect, simple, 4-angled, glabrous, rarely with scattered hairs (var. *hirtus* Rgl.), narrowly winged at the angles; leaves (3) 5–8 (12) cm long, 1.2–5 cm broad, coriaceous, lustrous and glabrous above, with very short cilia at margin, punctate-glandular beneath, more rarely thin, to 13–15 (17) cm long and 3–4 (8) cm broad (var. *macrophyllus* Volk.), scabrous, more rarely with scattered hairs (var. *hirtus* Rgl.), sessile or semiamplexicaul (in var. *macrophyllus* narrowed to a short petiole), coarsely obliquely serrate, the teeth somewhat curved and point-tipped; flowers in large compact axillary verticillasters, subtended by oval or lanceolate pointed bracts to 4–5 mm long; calyx 3 mm long, rarely 5 mm (var. *macrophyllus* Volk.), 5-toothed; teeth aristate, covered with short stiff hairs and numerous glands; corolla 3.5 mm long, white, unequally 4-lobed, glandular, the upper lobe slightly emarginate, the tube hairy in throat; stamens scarcely exerted; nutlets 1.3 mm long, 1 mm broad, trigonous, truncately obovoid, glandular, with thickened margin. June–July.

Mixed and inundated forests, shores of rivers and lakes, meadows, osier beds; also as a weed. — E. Siberia: Dau.; Far East: Ze.-Bu., Uss. **Gen. distr.:** China, Japan. Described from Dauria. Type in Leningrad.

5. *L. maackianus* (Maxim.) Makino in Tokyo Bot. Magaz. XI (1897) 382. Kom. Fl. Man'chzh. III (1907) 381; Kom. and Alis. Opred. rast. Dal'nevost. kr. II, 908. —

*L. sinuatus* Rgl. in Mém. Acad. Sc. Pétersb. VII sér. IV (1862) 115, non Etl. — *L. lucidus* var. *maackianus* Maxim. ex Herder in Bull. Soc. Nat. Mosc. II (1884) 12; Korzh. in Tr. Bot. sada, XII, 376. — *L. angustus* Makino in Tokyo Bot. Mag. XII (1898) 105.

Perennial; stolons long, filiform, creeping, rooting at nodes; stem 15–30 (40) cm long, simple, rarely branched, erect, slender, glabrous except for a ring of short hairs at nodes, rarely with scattered hairs (var. *pilosior* Volg.); leaves 4–7 cm long, 1.5–2 cm broad, the lower pinnatifid or pinnately toothed, with few remote teeth, rarely almost entire (narrow in var. *angustus* (Makino) Volk.), the upper often revolute-margined, the middle almost entire or with isolated small teeth, lanceolate or oblong-lanceolate, subsessile, glaucescent beneath, with a prominent midvein, punctate-glandular, 595 lar, glabrous or with scattered short hairs on the veins and between them (var. *pilosior* Volk.); semiverticels few-flowered in the axils of middle and upper leaves; bracts linear-lanceolate, to acrose, long-pointed; corolla white, to 3 mm long, glandular, about twice as long as calyx, with ring of hairs inside; stamens included to nearly equaling corolla; nutlets 1.2 mm long. June–August.

Boggy shores, margins of marshes, bogged-down and inundated meadows, sometimes sea shores, open scrub, occasionally wasteland. — Far East: Ze.-Bu., Uss. Gen. distr.: China. Described from China (Manchuria). Type in Leningrad.

Note. A form occurring in the Ussuriisk region (e.g. in the Vladivostok district and others) has larger, sharply dentate-serrate leaves, the cauline leaves not differentiated. This may perhaps be a cross between *L. maackianus* and *L. lucidus*. The plant described by Makino under the name *L. angustus* does not differ in anything but leaf shape and, to judge by herbarium material from the Far East, it is linked by way of intermediate forms with *L. maackianus*.

6. *L. europaeus* L. Sp. pl. (1753) 21; Ldb. Fl. Ross. III, 341; Kryl. Fl. Zap. Sib. IX, 2393; Shmal'g. Fl. II, 306. — *L. albo-roseus* Gilib. Fl. lith. II (1781) 71. — *L. vulgaris* Güldenst. It. I (1787) 425. — *L. niger* Güldenst. It. II (1791) 65 (nomen). — *L. decrescens* C. Koch in Linnaea, XXI (1848) 646. — *Marrubium aquaticum* Uspensky in Bull. Soc. Nat. Mosc. VII (1834) 367. — Ic.: Syreishch. Fl. Mosk. gub. III, 75. — Exs.: GRF, No. 633.

Perennial; rhizome stringlike, articulate; stolons long, slender; stems 25–80 cm long, glabrous or with scattered short hairs, more rarely with dense soft hairs, simple or slightly branched, erect or ascending at base, 4-angled, sulcate, with long creeping shoots at base; leaves oblong-elliptical or rarely lance-elliptical, narrowed to a short petiole, irregularly and coarsely sinuate-dentate or coarsely serrate, opposite, minutely punctate-glandular and short-haired along the veins on both sides (more densely beneath), more rarely with dense soft hairs or glabrous at least on the upper side; flowers numerous, in compact axillary whorls, subtended by linear-subulate bracts 4–5 (6) mm long; calyx 2.8–3 mm long, unevenly divided, somewhat glandular and ciliate, the teeth to 1.8 mm long, linear-lanceolate, terminating in a long subulate point, about equaling or exceeding corolla; corolla 4-lobed, yellowish-white, the tube longer than calyx-tube, with sparse short hairs outside, ciliate inside at base of stamens, equally lobed except for 596 broader uppermost lobe, mostly with purple speckles; stamens exserted, rarely shorter

than corolla (var. *minor* Herd.); nutlets flattened, obovoid truncate, glabrous or with few glands. May–August (September).

Shores of rivers, brooks and lakes, near springs, boggy meadows, more rarely grassy swamps, thickets, margins of swampy forests, and felling areas. — European part: Dv.-Pech., Balt., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bes., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., W., E. and S. Transc.; W. Siberia: all regions; E. Siberia: Yen. (S. part), Ang.-Say., Dau. (W.), Lena-Kol. (Yakutsk); Centr. Asia: Balkh., Dzu.-Tarb., T. Sh., Syr D., Kyz.-Kum., Ar.-Casp., Pam.-Al., Amu D. **Gen. distr.:** The whole of Europe except N. Scand., Asia Minor, Himalayas, China, Japan. Described from Europe. Type in London.

Note. Some specimens from S. Urals (Bol'shoi Ik valley, E.G. Bobrov's collections) differ from the typical form of *L. europaeus* in pronounced indument and larger flowers, thus approaching *L. mollis* Kern. (in Oesterr. Bot. Zeitschr. XVI, 1866, 371).

7. *L. hirtellus* Kom. in Oprel. rast. Dal'nevost. kr. II (1932) 908.

Perennial; rhizome short, slender, with bunches of long fibrous roots; stems solitary, to 15–30 (50) cm long; stolons long, creeping, filiform, covered with scattered short crisp hairs; leaves short-haired on both sides, more rarely glabrous (f. *glaber* Volk.), punctate-glandular, oblong-elliptical, gradually narrowed to petiole, sharply and coarsely toothed, the teeth often with subsidiary dentation; flowers in small compact semi-verticels; bracts few, aristate, shorter than calyx; calyx short-haired, toothed to the middle, the teeth linear-lanceolate, short-ciliate, exceeding the corolla; corolla short-haired in throat, glandular, short-ciliate at margin; stamens exserted; nutlets with enlarged thickened margin, densely glandular. July–August.

Far East: Uss. Endemic. Described from Khantakheza valley. Type in Leningrad.

Genus 1301.\* *Mentha*\*\* L.

L. Sp. pl. (1753) 576

Flowers in distant or approximate, variously directed, mostly dense many-flowered axillary verticillasters, or else flowers in capitate or spikelike inflorescences at ends 597 of branches, hermaphrodite or unisexual, the male with abortive ovary, the female with short abortive stamens, monoecious or dioecious, the two kinds often on different branches or in same inflorescence; calyx campanulate, infundibular or tubular-campanulate, 10-nerved, almost regular or bilabiate, or regular with 5 subequal teeth; corolla infundibular, mostly almost regular or slightly irregular, 4-lobed, with open naked or hairy throat, the tube gibbous or not so; corolla-lobes entire or slightly emarginate; upper lobe mostly somewhat broader than others, usually slightly emarginate or nearly entire; corolla-tube usually almost completely included in calyx; stamens 4, divergent, subequal, erect, mostly exserted (in male flowers) or nearly included,

\* Treatment by A. G. Borisova.

\*\* A plant name used by ancient authors, of mythological derivation.



the upper pair inserted slightly above the lower pair, the filaments glabrous; anthers bilocular, the locules parallel; style branches 2, subequal, short, usually subfiliform; nutlets ovoid, dry, smooth or slightly scabrous, obtuse and sometimes hairy at summit. Aromatic perennials, more rarely annuals; stems erect or ascending, simple or branched; leaves opposite, petiolate or subsessile or sessile, more or less dentate, serrate or crenate, usually acute, with cordate or cuneate base; floral leaves resembling the cauline; bracts lanceolate to linear-subulate or filiform, mostly inconspicuous.

Type species *Mentha spicata* L.

Note. Mints have the simplest flower structure among Labiates. They display great variability, the variable characters including leaf shape, indument, structure of inflorescence, dimensions of calyx and corolla (and their size relationship), length of stamens and style. In shady habitats, verticillasters tend to be distant and usually contain fewer flowers. Hybridization is of common occurrence. All these features render determination very difficult. In view of the great variability, some authorities have established a large number of species. During the years 1881–1883, Gandoger reported for Europe 580 species of *Mentha* and 63 species of *Pulegium*; he listed 138 mint species for France alone. Javorka (1934) recorded 232 mint species and a large number of varieties for the Hungarian flora. These numerous species are exceedingly difficult to identify, particularly in view of the fact that many of them are to be found in exactly the same conditions. Bentham, in his monograph on Labiatae, lists 33 synonyms for *Mentha sylvestris* L. and 89 synonyms for *M. arvensis* L.

598 In our treatment we are primarily concerned with the synonymy of species recorded or described from the range of the U.S.S.R. flora. Mints are distributed chiefly in the temperate regions of the Old and the New World, where they are widely and abundantly represented. When introduced into other areas, they are largely confined to moist habitats. One species has been recorded for South Africa, one for South America, and one for the Malay Archipelago.

At present it is difficult to establish the number of *Mentha* species. To this end, there is need for a specialized monographic study of this extremely widespread genus, including both field observations and cultivation tests.

For the U.S.S.R. we recognize 22 species classified under two subgenera: *Pulegium* (Mill.) Boriss. and *Menthastrum* (Coss. et Germ.) Boriss., the latter comprising three main groups – *Verticillatae* L., *Capitatae* L. and *Spicatae* L. The type species of these groups (sections) are *M. arvensis*, L., *M. aquatica* L. and *M. longifolia* (L.) Huds.

Mints are mostly associated with wet soils, the usual habitats being valleys, ravines, swamp margins, ponds, more rarely dry-valley meadows; they occur sometimes as weeds in fallows and along field borders.

The dioecious character of mints promotes hybridization between related species and also between species belonging to different sections. Pollination is effected by insects, mainly flies and beetles. There is apparently no self-pollination. One should mention the intensive vegetative spread of mints, especially among apogamous hybrids which often develop long stolons.

Leaves of hybrid forms are often curled or crisped, a feature that can be seen in cultivated mints of hybrid origin, such as *M. crispa* or *M. crispatata*. Hybrid species are often sterile or nearly so; they sometimes have female flowers only, the pollen being obsolescent.

**Economic importance.** Mints were already grown in antiquity for extraction of essential oil and for medicinal use, and they attained wide distribution in the Middle Ages. The prolonged cultivation has contributed to the formation of many hybrid forms; these are mostly propagated vegetatively, by means of rootstock division, stem cuttings and even leaf cuttings. The species widely occurring in cultivation include *M. piperita* L., *M. spicata* (L.) Huds. (= *M. viridis* L.), *M. crispa* L., *M. crispata* Schrad., *M. gentilis* L., *M. arvensis* L., and a few others. Most of the cultivated mints are of hybrid origin.

Mints are considered to be good honey plants, even though their nectar production is not abundant; they give transparent, amber-colored honey, with a pronounced mint scent and a pleasant refreshing taste. Oil content in various parts of the herbage ranges from 0.1 to 2 per cent. The principal constituent of mint oil is menthol (40–70 and up to 92%). The oil is widely used in the food industry (confectionery, liqueur production, etc.), in pharmaceutical preparations and in perfume industry. Menthol has antiseptic and analgesic properties; it is also used for treatment of frostbites. Mint oil is widely employed medicinally for its carminative and sedative action.

1. Calyx regularly or almost regularly toothed, broadly campanulate or infundibular-campanulate, not setiferous, straight, with glabrous throat, the teeth alike; corolla not gibbous; nutlets mostly ovoid, attenuate at apex, sometimes hairy (Subgenus *Menthastrum* (Coss. et Germ.) Boriss.) . . . . . 2.
- + Calyx bilabiate, tubular or campanulate-tubular, setiferous, sulcate, slightly curved, the throat hairy, closed in fruit, the two lower teeth subulate, the upper three short, triangular; corolla gibbous at throat; nutlets ovoid or globose, glabrous, not attenuate at apex (Subgenus *Pulegium* (Mill.) Boriss.) . . . . . 20.
2. Verticillasters in the axils of cauline leaves, sometimes nearly along the whole stem, many-flowered; leaves exceeding inflorescence, the floral and cauline alike; corolla with hairy or glabrous throat (Verticillatae) . . . . . 4.
- + Verticillasters crowded in a terminal inflorescence, this usually leafless, capitate or spiciform; lower verticillasters sometimes subdistant or nearly all verticillasters distant and forming a long interrupted inflorescence, but then cauline leaves not exceeding inflorescence; floral leaves linear or resembling the cauline but much smaller and then inflorescence 10–20 cm long; corolla with hairy or glabrous throat . . . . . 3.
3. Inflorescence capitate (rarely racemiform); lower verticillasters sometimes axillary or distant from the upper but always few (mostly 1 to 3) and with large floral leaves; calyx tubular; corolla with glabrous or hairy throat; nutlets hairless (Capitatae) . . . . . 8.
- + Inflorescences spikelike, sometimes with distant verticillasters, in lower part, or all verticillasters distant; floral leaves inconspicuous, filiform or like the cauline but much smaller; calyx campanulate, obscurely nerved; corolla mostly with glabrous throat; nutlets hairy at apex, rarely hairless, and then corolla ca. 6 mm long . . . . . 9.
4. Leaves undulate, strongly rugose, hairy (in cultivation), the margins irregularly incised . . . . . 6. *M. crispa* L.

- + Leaves not rugose, not undulate . . . . . 5.
5. Calyx short-campanulate, with obtuse teeth; verticillasters 6–10-flowered; corolla glabrous inside; pale green plants, subglabrous or sparsely hairy (Arctic Europe) . . . . . 2. *M. lapponica* Wahlenb.
- + Calyx-teeth acute . . . . . 6.
6. Leaves oblong-lanceolate, lance-elliptical or lanceolate, rarely oblong; calyx-teeth distinctly pointed, elongated, rarely short and then also pointed . . . . . 7.
- + Leaves oblong, elliptical or ovate-elliptical, rarely oblong-lanceolate, cuneate or rounded at base, dentate; calyx-teeth acute or scarcely acuminate, rather short, not elongate; verticillasters sessile or subsessile, mostly numerous, distant (mostly in the forest zone of Kamchatka) . . . . . 1. *M. arvensis* L.
7. Divaricately branched plants, hairy in upper part and on the angles below; leaves oblong-lanceolate, more rarely oblong, coarsely serrate; calyx-teeth narrow, elongate, long-pointed; flowers bluish-lilac; nutlets sharply keeled (S. part of E. Siberia and Far East) . . . . . 3. *M. haplocalyx* Briq.
- + Unbranched plants, more densely hairy; leaves lanceolate, rather shallowly serrate; calyx-teeth short, acuminate; stamens long; nutlets not keeled . . . . . 4. *M. sachalinensis* (Briq.) Kudo.
8. Calyx broadly campanulate, ca. 3 mm long, almost glabrous, the teeth obtusish or slightly pointed; verticillasters few, on peduncles 5–10 mm long; leaves short-petioled; bracts very small, about equaling pedicels, 2–3 mm long, subulate; corolla-tube hairy inside; stamens mostly about equaling the corolla (Dauria, Far East) . . . . . 7. *M. dahurica* Fisch.
- + Calyx tubular, larger, one-and-a-half times as long as pedicel, hairy at base, the teeth lance-subulate, acuminate, one-third to one-half the length of the tube, verticillasters usually numerous, short-pedicel; leaves long-petioled; bracts linear or lanceolate; corolla-tube glabrous inside; stamens one-and-a-half times as long as corolla (S.W. European part, Crimea, Caucasus) . . . . . 5. *M. aquatica* L.
- 601 9. Inflorescence dense, 10–20 cm long and ca. 2 cm broad; corolla ca. 6 mm long; all corolla-lobes more or less emarginate, glabrous outside except in broadest part; calyx 3–3.5 mm long, covered all over with short implexed hairs, the teeth acuminate from broadly triangular base, one-third to one-half the length of the tube; nutlets hairless; leaves large, the lower to 10 cm long, finely serrate-dentate, the teeth incurved . . . . . 11. *M. alaica* Boriss.
- + Inflorescence mostly less than 10 cm long, 1 cm broad, or longer but interrupted; corolla 2–4 mm long; all corolla-lobes hairy outside but only one lobe emarginate; calyx 1–2 mm long, glabrous or hairy, the teeth filiform or lanceolate, one-third to two-thirds the length of the tube; nutlets hairy at apex; leaves varying in size, the teeth not incurved . . . . . 10.
10. Corolla 2.5–2.75 mm long, densely hairy and glandular outside; calyx 1–2 mm long, with numerous punctate glands; stems simple or sparingly branched; inflorescences mostly solitary, unbranched; leaves sessile, oblong-lanceolate, usually large, minutely puberulent beneath . . . . . 14. *M. kopetdaghensis* Boriss.
- + Corolla 3–4 (5) mm long; calyx ca. 3 mm long or 1.5–2.5 mm and then inflorescence not more than 0.5–0.7 cm broad and leaves petiolate; stems often branched



- or simple; inflorescences mostly several at summit, branched, sometimes solitary; leaves glabrous on both sides or only above or else pubescent or hairy on both sides, the upper sessile or petiolate . . . . . 11.
11. Leaves long-haired or puberulent on both sides or pubescent only beneath, green above, glabrous or nearly so, glaucous or whitish . . . . . 14.  
+ Leaves glabrous or subglabrous, dark- or bright-green on both sides . . . . . 12.
12. Leaves undulate, crisp, rugose, ovate to lanceolate, deeply toothed; glabrous plants; calyx-teeth somewhat connivent in fruit (cultivated form) . . . . . 18. *M. crispata* Schrad.  
+ Leaves not crisp or rugose; calyx-teeth not connivent in fruit . . . . . 13.
13. Leaves mostly terminal, sessile or with very short petiole; inflorescences slender, interrupted; bright green plants (cultivated and sometimes naturalized) . . . . . 17. *M. spicata* L.  
+ Leaves all petiolate; inflorescences rather thick, interrupted only at base; dark green plants (cultivated and sometimes naturalized) . . . . . 16. *M. piperita* L.
- 602 14. Inflorescences with distant verticillasters, especially in lower part, 10–20 cm long; plants to 1 m high and even higher; lower and sometimes all floral leaves similar to cauline but smaller or else subulate to filiform (Altai, Tien Shan) . . . . . 15. *M. interrupta* Boriss.  
+ Inflorescences at ends of branches, rather compact, with approximate verticillasters, sometimes only the lower verticillasters distant; floral leaves small, inconspicuous . . . . . 15.
15. All leaves sessile, orbicular or ovate, mostly obtuse, cordate at base, crenate, or crenate-dentate, green or subglabrous above, white-tomentose beneath, rather thick, rugose; flowers small, in compact spikelike inflorescences; corolla whitish, light lilac or lilac; calyx-teeth eciliate (cultivated and naturalized) . . . . . 19. *M. rotundifolia* (L.) Huds.  
+ Only upper leaves sessile, the lower short petioled, or all leaves sessile and not crenate at apex, not obtuse and not ovate or else all leaves petiolate . . . . . 16.
16. All leaves with petiole 5–10 mm long, large, 8–10 cm long, or small, 1–3 cm long, with petiole 1–5 mm long . . . . . 17.  
+ Leaves all sessile or the lower with very short petiole . . . . . 18.
17. Plants 50–160 cm high; leaves with petiole 7–10 mm long, large, 8–10 cm long, 2–3 cm broad, ovate to oblong or lanceolate, sparsely and shallowly denticulate, subacute, glaucescent above with fine pubescence or subglabrous, soft-puberulent beneath (W. Pamiro-Alai) . . . . . 13. *M. pamiroalaica* Boriss.  
+ Leaves with petiole 1–5 mm long, the blade 1–3 cm long, ca. 1 cm broad, ovate to oblong-ovate, rounded at base, glaucous with short crisp hairs, mucronate (Darvaz) . . . . . 12. *M. darvasica* Boriss.
18. Plants grayish-white all over with dense tomentum, branched from base, the branches long, divaricate, in subcorymbose arrangement; leaves relatively small, 1–3 (5) cm long, 1–2 cm broad, often plicate and recurved, cordate at base, sessile; internodes elongate, shorter than leaves; inflorescences solitary, mostly unbranched, slender, cylindrical, 3–5 cm long, sometimes interrupted in lower part (Central Asia) . . . . . 10. *M. vagans* Boriss.

- + Plants differing from above . . . . . 19.
19. Leaves mostly sessile, large, oblong to lanceolate, hairy on both sides, sometimes  
 603 only the lower side densely hairy or tomentose (the hairs flat, multicellular, with  
 constrictions) the upper side glabrous, dark green or green, the margin mostly un-  
 evenly deeply and coarsely dentate or sharply serrate-dentate; inflorescences ra-  
 ther thick, compact; pedicels sometimes long-haired; calyx mostly equaling calyx-  
 tube, patent-haired, the teeth about as long as the tube; corolla ca. 3 mm long  
 (European part, Caucasus) . . . . . 8. *M. longifolia* (L.) Huds.
- + Leaves short-petioled or sessile, usually of moderate size, mostly oblong to ellip-  
 tical, sparsely shallowly and evenly dentate, grayish-glaucous on both sides, finely  
 velutinous or tomentose, the hairs short, fine, crisp, obscurely articulate, without  
 constrictions; inflorescences fairly dense but rather slender, sometimes interrupted;  
 pedicels short-haired; calyx shorter than corolla, with appressed hairs, the teeth one-  
 quarter to one third the length of the tube; corolla ca. 4–5 mm long (Centr. Asia) .  
 . . . . . 9. *M. asiatica* Boriss.
20. Perennials; stem and leaves hairy; leaves ovate, oval or orbicular, obtuse, dentate;  
 inflorescence 12–15 mm or 5–7 mm broad; bracts ovate; corolla 2–3 times length  
 of calyx, 4.5–7 mm long; style as long as or slightly exceeding corolla . . . . 21.
- + Annuals; stem and leaves glabrous; leaves oblong, ovate-oblong or ovate, acute,  
 almost entire; inflorescence 7–12 mm broad; bracts linear or linear-lanceolate;  
 corolla one-and-a-half times as long as calyx, 3–3.5 mm; style shorter than corolla. .  
 . . . . . 22. *M. micrantha* Fisch.
21. Inflorescence 5–7 mm broad; calyx ca. 1.5 mm long; upper calyx-teeth short and  
 broad; leaves obscurely dentate, small, ovate-orbicular, 5–10 mm long, 3–6 mm  
 broad; spreading, short-pubescent plants (Daghestan) . . . . .  
 . . . . . 21. *M. daghestanica* Boriss.
- + Inflorescence 12–15 mm broad; calyx ca. 3 mm long; upper calyx-teeth lanceolate-  
 triangular, ca. 1 mm long; leaves entire or scarcely dentate, oval or ovate, 8–25 mm  
 long, 5–12 mm broad; stems erect and prostrate, hairy . . . . 20. *M. pulegium* L.

Subgenus 1. *Menthastrum* (Coss. et Germ.) Boriss. comb. n. — Sect. *Menthastrum*  
 Coss. et Germ. Flore des env. de Paris, I (1845) 314; sect. *Eumentha* Gren. et Godr.  
 Flore de France, II (1850) 648. — Calyx regular, broadly campanulate or infundibular-  
 campanulate, straight, the teeth alike in shape, equal or nearly so, the throat glabrous,  
 604 rous throat, not gibbous, one of the lobes or rarely all lobes emarginate; nutlets ovoid,  
 ca. 1 mm long, 0.75 mm broad, sometimes hairy, attenuate at apex. Perennials, 25–  
 180 cm high; stems simple or branched in middle part.

Widely distributed in Europe, Asia and North America.

Section 1. *Verticillatae* L. Sp. pl. (1763) 805, div.; Briq. in Pflanzenfam. IV,  
 3a, 318. — *Cladanthae* Gdgr. *Menthae* nov. 1–2 (1881), 44, div. — *Verticillasters*

in the axils of large cauline leaves, many-flowered, dense or fairly loose, distant, sometimes disposed nearly all along the stem; leaves exceeding the inflorescence, the floral resembling the cauline; calyx campanulate or tubular-campanulate; corolla with hairy throat; nutlets glabrous.

Series 1. *Arvenses* Benth. in DC. Prodr. XII (1848) 171, p. p.; Briq. in Pflanzenfam. IV, 3a, 319. — Stems branched; verticillasters dense; calyx campanulate, the teeth not elongate, acute or obtuse, the throat glabrous; leaves dentate, mostly ovate-elliptical to oblong.

1. *M. arvensis* L. Sp. pl. (1753) 577; Benth. in DC. Prodr. XII, 171; Ldb. Fl. Ross. III, 338, ex p.; Benth. Lab. gen. et sp. 178; Boiss. Fl. or. IV, 544; Briq. in Pflanzenfam. IV, 3a, 319; M. B. Fl. taur.-cauc. II, 45; Kryl. Fl. Zap. Sib. IX, 2397; Grossg. Fl. Kavk. III, 349. — *M. sativa* L. Sp. pl. (1763) 805 p. p. — *M. sativa* var. *arvensis* Schmalh. Fl. II (1897) 307. — *M. agrestis* Sole, Menth. Brit. (1798) tab. 14. — *M. astrachanica* Gdgr. Menthae nov. 1–2 (1881) 68. — *M. singularis* Gdgr. l. c. 32. — *M. ruthenica* Gdgr. l. c. 35. — *M. rossica* Gdgr. l. c. 36. — *M. borysthena* Gdgr. l. c. 37. — *M. besseriana* Gdgr. l. c. 45. — *M. ingrica* Gdgr. l. c. 45. — *M. ledebouiriana* Gdgr. l. c. 47. — *M. wolgensis* Gdgr. l. c. 47. — *M. petersburgensis* Gdgr. l. c. 39. — *M. diversifolia* Dumortier, Fl. Belg. (1827) 49; H. Braun in Verh. Zool.-bot. Ges. Wien, XL, 3 (1890) 468. — *M. palustris* Moench, Meth. pl. (1794) 380. — *M. austriaca* Jacq. Fl. Austr. V (1778) 14; H. Braun, l. c. 446; M. B. l. c. III, 395; Grossg. op. cit. 349. — Kryl. op. cit. 2396. — *M. arvensis* ssp. *austriaca* Briq. l. c. 319. — *M. arvensis* var. *vulgaris* Benth. in DC. Prodr. XII (1848) 172, p. p. et Lab. Gen. et sp. 179, p. p.; Ldb. l. c. 339. — *M. lapponica* DC. l. c. 173, non Wahlenb. — *M. canadensis* Herder in Bull. Soc. Nat. Mosc. LXI, 1 (1885) 125, p. p. — Ic.: Fedch. and Fler. Fl. Evrop. Ross. Fig. 761; Syreishch. Fl. Mosk. gub. III, 73; Hegi, III. Fl. V, 4, tab. 224. fig. 2, fig. 3222. — Exs.: Pl. Finl. exs. No. 883, 884; Fl. Ross. bor.-occid. No. 592; Herb. Fl. Ingr. No. 479; GRF, No. 1533.
- Perennial; rhizome creeping; stems 15–50 (100) cm long, mostly prostrate, more rarely erect, assurgent or decumbent, simple or mostly branched, with elongated off-  
605 shoots, sometimes reddish, usually villous-pubescent with retrorse hairs or subglabrous; leaves ovate, ovate-oblong, oblong-elliptical to lance-oblong, 2–7 cm long, 1–3.5 cm broad, acute, serrate-dentate, short-petioled or the upper sessile, rounded or cordate or cuneate base, hairy and glandular on both sides or subglabrous; bracts linear-lanceolate or lanceolate, ciliate and hairy, acute, about equaling or slightly exceeding the pedicels; verticillasters distant, usually numerous and many-flowered, spherical; pedicels hairy, rarely glabrous; calyx campanulate, ca. 2.5 mm long, often violet, hairy, with glabrous throat, the teeth erect, short, triangular, one-third the length of the tube, muticous, acute; corolla broadly tubular, lilac or rose-lilac, hairy outside and inside, 3.5–5 mm long, the tube included or slightly exerted to twice as long as calyx, the lower lobe obtuse, subtruncate, the uppermost broadest, emarginate; stamens equaling the corolla or slightly exceeding the tube; nutlets globose, ca. 1 mm long and as broad, obtuse at apex, smooth, not keeled. June–October. (Plate XXXII, Figure 3.)



Fields, meadows, shores of ponds, rivers, lakes, canals and irrigation ditches, swampy places, boggy shady woods, mainly in the forest zone. — European part: all regions. — Caucasus: Cisc., E. Transc.; W. and E. Siberia: throughout as far as Kamchatka, except the S. part of Irkutsk Province and Transbaikalia; Centr. Asia: Ar.-Casp., Balkh., T. Sh., Pam.-Al., Mtn. Turkm. **Gen. distr.:** W. Eur., Ind.-Him., China. Described from Europe. Type in London.

**Note.** Calyx shape varies with sex and development stage. It has been noted that, in cases where stamens are abortive or shorter than corolla-tube, the flowers are smaller and fruiting calyx is campanulate, with spreading teeth, and hence apparently shorter. Leaf shape is also very variable, ranging from ovate, with rounded or cordate base (*M. arvensis*) to oblong with cuneate base (*M. austriaca*). Many transitional stages occur in nature, often noticeable on the same plant. Most specimens of *M. arvensis* have leaves with cuneate base.

*M. arvensis* gives rise to many hybrid forms, some of which have been described as distinct species. The best known hybrids are the following:

× *M. verticillata* L. Syst. Natur. ed. 10, II (1759) 1099. (*M. arvensis* × *M. aquatica*) — *M. sativa* var. *verticillata* Schmalh. Fl. II (1897) 307. — *M. palustris* Moench, Meth. pl. (1794) 780. — Exs.: GRF, No. 332.

606 Perennial, usually villous-lanate, rather large; verticillasters in the leaf axils, forming a long interrupted inflorescence; calyx tubular, the teeth subulate from triangular base. A form not readily distinguishable, sometimes occurring in the Ukraine.

× *M. gentilis* L. Sp. pl. (1753) 576. [*M. spicata* × *M. arvensis*] — *M. sativa* var. *gentilis* Schmalh. Fl. II (1897) 307. — *M. arvensis* α: *sativa* Benth. in DC. Prodr. X (1848) 171. — *M. arvensis* var. *parietariifolia* Briq. in Pflanzenfam. IV, 3a (1897) 319; Britskis, Opr. latv. fl. (1946) 255. — *M. pratensis* Sole, Menth. Brit. (1798) tab. 17; Ldb. Fl. Ross. III, 377; Benth. in DC. Prodr. XII, 168.

Perennial, glabrous with scattered hairs or somewhat scabrous; leaves with petiole to 6 cm long, ovate-elliptical or oblong-elliptical, sharply serrate; calyx tubular-campanulate, with triangular-lanceolate teeth; corolla bright violet, glabrous inside. A cultivated form. Occurring sporadically in Bessarabia and S. W. Ukraine among mint stands, also naturalized; reported for U. V. (Moscow Province) and V.-Kama (Kazan').

**Economic importance.** *M. arvensis* is widely cultivated. Particularly widespread in cultivation is var. *piperascens* hort.; the menthol content in the essential oil of this variety reaches 62–92%.

2. *M. lapponica* Wahlenb. Fl. Lapp. (1812) 161; Benth. Lab. gen. et sp. 181 et in DC. Prodr. III, 173; Ldb. l. c.; Fedch. and Fler. Fl. Evrop. Ross. 837. — Ic.: Wahlenb. l. c. tab. 10.

Perennial, with creeping rhizome; stems rough with retrorse hairs or subglabrous, simple or slightly branched, hollow, sometimes slightly compressed; the whole plant pale green; leaves petiolate, oblong, very thin, serrate, narrowed at base, glabrous, roughened beneath with sparse hairs; lower leaves sublustrous; floral leaves resembling the cauline; inflorescence leafy; verticillasters distant, few-flowered; pedicels glabrous,

longer than the flowers; calyx hispid, short-campanulate, with obtuse teeth; corolla pink, glabrous inside; stamens exceeding corolla. July–August.

Wet sandy river banks. — European part: Kar.-Lap. Gen. distr.: Scand. Described from Lapland. Type in Sweden?

Series 2. *Sibiricae* Boriss. — Stems simple or sparingly branched; verticillasters rather loose, very distant, numerous; calyx tubular-campanulate or campanulate, with long-acuminate teeth; leaves 3–9 cm long, oblong-lanceolate or lanceolate, more rarely oblong, petiolate.

- 607 3. *M. haplocalyx* Briq. in Pflanzenfam. IV, 3a (1897) 319; Kom. and Alis. Opređ. rast. Dal'nevost. kr. II, 909. — *M. arvensis* var. *haplocalyx* Briq. l. c. — *M. arvensis* var. *canadensis* Maxim. Prim. Fl. Amur. (1859) 215. — *M. canadensis* Turcz. Fl. baic.-bah. II (1845) 393, non L. — *M. arvensis* Turcz. l. c. non L.

Perennial; stems usually 40–60 to 70 cm long, sulcate, hairy in upper part, with hairs on the angles below, simple, more rarely with few branches; leaves petiolate, elongate, oblong or lance-oblong, 3–8 cm long, 8–30 mm broad, remotely and coarsely dentate-serrate, mucronate, short-haired, glandular on both sides; upper leaves exceeding the terminal inflorescences; bracts longer than pedicel and calyx, ciliate, lance-linear; verticillasters sessile, dense, many-flowered; pedicels shorter than calyx, glabrous; calyx tubular-campanulate, ca. 2.5 mm long, the teeth linear-subulate, mucronate, one-third to one-half the length of the tube; corolla bluish-lilac, hairy outside, ca. 4 mm long; upper lip deeply 2-lobed, the lower composed of 3 equal oblong obtuse lobes; stamens ca. 5 mm long, exserted; style about equaling the corolla, with 2-lobed stigma; nutlets 1 mm long, 0.5 mm broad, oblong, sharply keeled. Fl. July–August; fr. August.

Water meadows, waterside thickets, shores of ponds. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau.; Far East: Ze.-Bu., Uda, Uss. Gen. distr.: N. China, Korea, Japan. Described from E. Asia. Type?

4. *M. sachalinensis* (Briq.) Kudo in Journ. college Sc. Univ. Tokyo, XLIII, 8 (1921) 47 et Rep. Veg. N. Saghal. 210. — *M. arvensis* subsp. *haplocalyx* var. *sachalinensis* Briq. in Pflanzenfam. IV, 3a (1897) 319; Matsum et Kudo in Bot. Mag. Tokyo, XXVI, 300; Miyabe and Miyake, Fl. Saghal. 361; Sugawara, Pl. of Saghal. 273; Fl. S. Saghal. 66. — *M. arvensis* var. *vulgaris* Benth. Lab. gen. et sp. (1832–1836) 174, p. p. — *M. arvensis* Fr. Schm. Fl. Sachal. (1868) 164, non L.; Koidzumi, Pl. Sachal. 105, non L. — *M. canadensis* Herder in Bull. Soc. Nat. Mosc. LXI, 1, (1885) 119, non L. quoad Pl. Sachal. p. p. — *M. canadensis* var. *sachalinensis* Kudo, l. c., pro syn. — Ic.: Sugawara, III. Fl. of Saghal. tab. 739.

Perennial; stems 50–100 cm long, unbranched, hairy on the angles; leaves lanceolate, (4) 5–9 cm long, 1–3.5 cm broad, with petiole to 1.5 cm long, remotely and shallowly serrate, glandular on both sides, with sparse short hairs; bracts linear, exceeding the pedicels, ciliate; verticillasters spherical, sessile, up to 16 in number, disposed all along the stem, many-flowered; pedicels 1–3 mm long, glabrous; calyx campanulate,

608 ca. 3 mm long, the teeth acuminate, ca. 1 mm long; corolla ca. 4 mm long; stamens ca. 5 mm long, considerably exceeding the corolla; anthers rounded; style ca. 5 mm long, the stigma scarcely lobed; nutlets 1 mm long, slightly more than 0.5 mm broad, oblong, acutish, not keeled. July–August.

Far East: Sakh. (S. part and S. Kurile Islands). Gen. distr.: N. Japan. Described from Sakhalin.

Section 2. **Capitate** L. Sp. pl. II (1763) 805, div.; Briq. in Pflanzenfam. IV, 3a, 320. — *Terminales* Benth. in DC. Prodr. XII. (1848) 165 p. p. — *Arvenses* Benth. l. c. 171, p. p. — *Cephalanthae* Gdgr. *Menthae* nov. 1–2 (1881) 17, div. — Verticillasters 1–3, forming short capitate or rarely racemiform, terminal inflorescences; lower verticillasters sometimes axillary; leaves shorter than inflorescence; calyx tubular or tubular-campanulate; corolla with glabrous or hairy throat; nutlets glabrous.

Series 1. *Aquatica* Boriss. — Pedicels very short; calyx tubular, with long acuminate lance-subulate teeth; corolla with glabrous throat.

5. *M. aquatica* L. Sp. pl. (1753) 576; M. B. Fl. taur.-cauc. II, 45; Ldb. Fl. Ross. III, 337, p. p.; Boiss. Fl. or. IV, 544, p. p.; Benth. Lab. Gen. et sp. 176 et in DC. Prodr. XII, 170; Grossg. Fl. Kavk. III, 348. — *M. hirsuta* L. Mant. (1767) 81, p. p.; ed. Willd. Sp. pl. III, 78; M. B. Fl. taur.-cauc. II, 45. — *M. eriantha* Koch in Linnaea, XXI (1848) 650. — *M. sativa* var. *aquatica* (L.) Schmalh. Fl. II (1897) 307. — *M. palustris* Mill. Gard. Dict. ed. VIII (1768) No. 11. — *M. capitata* Gilib. Fl. lithuan. II (1781) 72. — *M. aquatica*  $\alpha$ . *nemorosa* Koch in Linnaea, XVII (1843) 292. — *M. aquatica*  $\beta$ . *hirsuta* Willd. Enum. pl. hort. Berol. II (1809) 610. — *M. aquatica* var. *hirsuta* Hohenack. Enim. Talüsch. (1838) 69. — *M. volhynica* Gdgr. *Menthae* nov. 1–2 (1881) 19. — *M. lithuanica* Gdgr. l. c. 20. — *M. polonica* Gdgr. l. c. 21. — *M. esthonica* Gdgr. l. c. 23. — Ic.: Hegi, III. Fl. V, 4, tabl. 224, fig. 3; fig. 3227; Syreishch. Fl. Mosk. gub. III, 72; Rochel in Linnaea, XII, tab. 6, No. 7. — Exs.: GRF, No. 382.

Perennial; with long creeping stolons; stems 20–100 cm long, erect or ascending, branched, subglabrous or rather densely covered, especially in upper part, with retrorse hairs but glabrous at nodes; stems usually rough; leaves ovate or elliptical, 2–5 cm long, 1–3 cm broad, acuminate, serrate, rounded or subcordate at base, the lower sometimes cuneate, long-petioled; leaves sometimes abruptly narrowed to petiole, subglabrous or hairy, punctate-glandular, more hairy beneath, sometimes grayish; lower floral leaves resembling the cauline, the upper similar to bracts, shorter than verticillasters; verticillasters 2 or 3, approximate at ends of stems and forming capitate sub-ovaloid-spherical or oblong capitate inflorescences, these borne on peduncles in the leaf axils; lower verticillasters sometimes subdistant; pedicels with retrorse hairs; bracts linear-subulate or linear, sometimes lanceolate, larger in male and hermaphrodite specimens; calyx one-and-a-half times as long as pedicels, glabrous with patent hairs, punctate-glandular



tubular; calyx-tube more or less sulcate, with 13 prominent nerves; calyx-teeth one-third to one-half the length of the tube, lanceolate or linear-subulate, terminating in a subulate point, dilated at base; corolla in staminate flowers 6–8 mm long, 2–2½ times as long as calyx, reddish-lilac or pink, hairy outside; stamens prominent, one-and-a-half times as long as corolla, sometimes shorter; female flowers smaller, mostly with included abortive stamens and barren anthers; nutlets minutely punctate, subglobose-ovoid. June–August.

Near water, wet banks of rivers and brooks, boggy places, mainly in the forest zone. — European part: Balt., Lad.-Ilm., U. Dnp., M. Dnp., U. Dns., Bl., Crim., L. Don, Bes., L. V.; Caucasus: Cisc., W., E. and S. Transc., Dag., Tal. **Gen. distr.:** Centr. and S. Eur., Bal.-As. Min. (Asia Minor), Arm.-Kurd., Iran. Described from Europe. Type in London.

**Note.** A polymorphic plant, the variable characters including indument, leaf shape, length of flower parts, etc.

For hybrids recorded see pages 434, 440, 446.

Beside the almost glabrous specimens of *M. aquatica*, profusely hairy plants occur in Crimea and in the Caucasus; these have been described as distinct species — *M. hirsuta* L., *M. eriantha* Koch, the latter apparently identical with *M. aquatica* var. *incana* Boiss. (Fl. or. IV, 1879, 544).

**Economic importance.** The plant contains essential oil suitable for soap production; the yield amounts to 0.15–0.81%. The chief component appears to be carvone (Grossheim).

6. *M. crispa* L. Sp. pl. (1753) 576. — *M. arvensis* var. *crispa* Benth. in DC. Prodr. XII (1848) 173; Ldb. Fl. Ross. III, 339. — *M. sativa* Schmalh. Fl. (1897) 307 p. p. — **Ic.:** Komarov, Sbor., sushka i razv. lek. rast., Ed. 3, Plate 30; Rochel in Linnaea, XII, tab. 6, 1.

Perennial, 30–100 cm high; leaves sessile or short-petioled, broadly cordate-ovate to suborbicular, often conduplicate, strongly rugose, undulate or crisp, irregularly and deeply incised-serrate or lacerate-dentate, hairy on both sides; verticillasters crowded at ends of stems; calyx regular, glabrous or with appressed hairs in throat; flowers pink or lilac, 610 mostly on upper part of stem, sometimes crowded in a head or a cylindrical terminal inflorescence; stamens equaling corolla. July–August.

Cultivated on a small scale in the Ukraine. Described from Siberia. Type in London.

**Note.** Schmalhausen (Fl. II, 307) regards *M. crispa* L. as a cultivated variety of *M. sativa* L., apparently of hybrid origin.

**Economic importance.** The plant contains 0.7–1.5% essential oil. It is grown for its oil and is also used as a herb; it has a pleasant aromatic scent and sharply spicy flavor, but does not produce a cooling sensation. It is used for preparation of bitter liqueurs. It also has medicinal applications (*Folia Menthae crispae*).

Series 2. *Dahuricae* Boriss. — Peduncles 5–10 mm long; calyx tubular-campanulate, in fruit broadly campanulate, with short broad teeth; corolla with hairy throat.

7. *M. dahurica* Fisch. ex Benth. Lab. gen. et sp. (1832–1836) 181; DC. Prodr. XII, 173; Maxim. Prim. Fl. Amur. 215; Kom. and Alis. Opred. rast. Dal'nevost. kr. II, 909. — *M. aquatica* ssp. *sibirica* Briq. in Pflanzenfam. IV (1897) 320. — *M. organoides* Maxim. in herb. — *Horminum clinopodiifolium* Pers. Syn. 2 (1807) 132. — *Lepechinia clinopodiifolia* Willd. ex Benth. l. c. 182. — *Calamintha ussuriensis* Rgl. et Maak in Regl. Tentamen Fl. Ussur. (1862) 116. — *Satureia ussuriensis* Kudo in Journ. college Sc. Univ. Tokyo, XLIII, 8 (1921) 36 p. p. — *lc.*: Rgl. et Maak, l. c. tab. IX, fig. 10–11.

Perennial, with numerous filiform stolons; stems 15–60 cm long, usually simple, more rarely branched, sulcate, 4-angled, subcanescent with very short recurved hairs; leaves short-petioled, ovate or oblong, 2–5 cm long, 8–20 mm broad, large or small, serrulate-denticulate, with spreading teeth or subentire, glandular only beneath, glabrous on both sides, only on the veins with short setiform hairs, acute to subobtusely; floral leaves resembling the cauline; verticillasters 1–3, subdistant, few, broadly capitate, disposed in upper part of stem and exceeding the leaves, the upper two usually approximate and the third subdistant; peduncles 5–10 mm long; bracts subulate, very small, shorter than or rarely about equaling the pedicels; pedicels 2–3 mm long, with retrorse hairs; calyx ca. 3 mm long, at first tubular-campanulate, in fruit broadly campanulate, 611 subglabrous, striated 10-nerved, glabrous in throat; teeth 4–5, broadly triangular short, slightly pointed or obtusish, one-quarter the length of the tube; corolla bright lilac, rarely whitish, ca. 4 mm long, the tube equaling the calyx, with hairy throat, the lobes rounded, obtuse, ca. 1 mm long, the upper lip 2-lobed, with quadrate limb; stamens about equaling the corolla, one pair slightly longer than the other; anthers violet, turning reddish, parallel, rounded; style ca. 5 mm long; stigma short-lobed; nutlets globose or ovoid; globose, 0.75 mm long, 0.55 mm broad, obtuse at apex, obtusely keeled, smooth, dull brown. July–September. (Plate XXXII, Figure 2.)

Water meadows, more rarely dry valley meadows, among sedge-and-grass and reedgrass associations, shores of rivers and lakes, thickets, wood margins, boggy places, and wastelands. — E. Siberia: Dau., Lena-Kol.; Far East: Uda, Uss., Ze.-Bu. **Gen. distr.**: N. China, N. Japan (Hokkaido Island). Described from Dauria. Type in Leningrad.

Note. Specimens with abortive stamens and long exserted style occur occasionally.

The following varieties have been distinguished: 1) var. *stolonifera* Kom., with branched stems, small leaves, bright lilac corolla, and long filiform stolons arising from base of stems (valley meadows); 2) var. *umbrosa* Kom., usually with simple stems, larger leaves, and whitish corolla (riverside osier beds).

Section 3. **Spicatae** L. Sp. pl. II (1763) 804, div. — **Terminales** Benth. in DC. Prodr. XII (1848) 165; Briq. in Pflanzenfam. IV, 3a (1897) 321. — Sect. **Spicastrae** Briq. l. c. — **Stachyanthae** Gdgr. **Menthae** nov. 1–2 (1881) 98. — Verticillasters in terminal spikelike inflorescences, sometimes axillary in lower part; leaves shorter than inflorescences; calyx campanulate, obscurely 10-nerved; corolla with glabrous throat; nutlets hairy at apex or glandular.

Series 1. *Silvestres* Malinv. ex Briq. in Pflanzenfam. IV, 3a (1897) 321. — Calyx campanulate, about equaling the corolla-tube, patent-haired, the teeth about as long as the tube; indument consisting of hairs with marked constrictions, strongly attenuate; leaves large, oblong to lanceolate, dentate or serrate-dentate, hairy or tomentose on both sides or only beneath.

8. *M. longifolia* (L.) Huds. Fl. Angl. (1762) 221; Kryl. Fl. Zap. Sib. IX, 2398; Grossg. Fl. Kavk. III, 348; Briq. in Pflanzenfam. VI, 321. — *M. spicata*  $\alpha$ . *longifolia* L. Sp. pl. (1753) 576. — *M. sylvestris* L. Sp. pl. (1763) 804; M. B. Fl. taur.-cauc. II, 44; Ldb. Fl. Ross. III, 336, p. p.; Boiss. Fl. or. IV, 543 p. p.; Benth. in DC. Prodr. XII, 166 et Lab. gen. et sp. 171; Shmal'g. Fl. II, 306. — *M. spicata* Gilib. 612 Fl. lithuan. II (1782) 72, non L. — *M. gratissima* Steph. Fl. mosq. (1795) No. 386. — *M. nemorosa* Willd. Sp. pl. III (1799) 75. — *M. chersonensis* Gdgr. Menthae nov. 1–2 (1881) 109. — *M. mollissima* Borkh. in Fl. d. Wett. II (1800) 348. — *M. slavica* Gdgr. l. c. 101. — *M. wolfgangiana* Gdgr. l. c. 98. — *M. villosa* Sole, Ment. brit. tab. 1 et 2. — *M. balsamifera* H. Braun in Verh. Zool.-bot. Ges. Wien, XL (1890) 380. — *M. candicans* Crantz, Stirp. Austr. (1769) 330. — *Ис.*: Syreishch. Fl. Mosk. gub. III, 71; Maevskii, Fl. 418; Hegi, III. Fl. V, 4, tab. 224, fig. 5, fig. 3231; Rochel in Linnaea, XII, tab. 6, No. 4. — Exs.: Fl. Pol. exs. No. 983.

Perennial, with creeping rhizome; stems erect, branched or nearly simple, 30–100 (180) cm long, usually sharply 4-angled, whitish, densely covered (especially in upper part) with short soft usually retrorse hairs, sometimes tomentose-hairy with subreflexed woolly hairs or sparsely hairy; leaves sessile or the lower short-petioled, ovate-oblong to oblong-lanceolate or lanceolate, (3) 5–15 cm long, 1.5–3.5 cm broad, often rather thick, acute or acuminate, more rarely triangular, mostly unevenly and coarsely serrate-dentate, smooth, glaucescent or cinereous above, rather densely covered with soft appressed hairs, sometimes at length glabrescent, white-tomentose or lanate beneath, rounded or subcordate at base, amplexicaul; floral leaves resembling the bracts, linear-subulate; peduncles pubescent; verticillasters approximate at ends of stems and branches; inflorescences dense, leafless, spiciform-cylindrical, pointed at summit, 3–5 cm long; lower verticillasters sometimes distant; pedicels densely tomentose-hairy; calyx campanulate, about as long as pedicel and corolla tube, soft-haired to base, the teeth linear-subulate, connivent in fruit, about as long as the tube; corolla 4–5 mm long, 2–2½ times length of calyx, rose-lilac or lilac, sparsely and finely pubescent outside, glabrous inside, the tube about as long as the lobes, upper lobe oblong-ovate, emarginate or crenate, the other lobes narrower, oblong, obtuse; stamens included in corolla; nutlets alveolate, rounded and hairy at apex, ovoid. July–September. (Plate XXXII, Figure 4.)

Wet banks of rivers, lakes, margins of swamps and canals. — European part: Balt., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., U. Dns., Bes., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., W., E. and S. Transc., Dag.; W. Siberia: U. Tob., Irt. **Gen. distr.**: Scand., Atl. and Centr. Eur., Med., Bal.-As. Min., Arm.-Kurd. Described from Europe. Type in London.

- 613 **Note.** The species is exceedingly polymorphic; according to Briquet (in Pflanzenfam. VI, 321), it displays greater variability than any other plant species and it is



widely distributed. The variable characters include plant size, dimensions of foliage and individual leaves; on this basis Topitz distinguishes in W. and Centr. Europe 37 varieties, while Trautmann lists 87 minor species for Hungary alone. A form described for the Caucasus in ssp. *caucasica* Briq. (= *M. caucasica* Gdgr., = ? *M. nigrescens* C. Koch, = ? *M. kuntzii* Borbas, = *M. sylvestris* var. *incana* Rchb., etc.), is distinguished by the following features: stems relatively short (30–60 cm), robust, sharply 4-angled, mostly simple, branched only in inflorescence, with straight branches; leaves green and glabrous or subglabrous above, white beneath with dense tomentum, all sessile or very rarely the lower short-petioled, large, oblong or ovate-oblong, serrate-dentate with long slender teeth; inflorescences dense, broad, densely hairy, mostly short, sometimes branched at base, crested when young with filiform bracts; corolla hispid. The plant grows in damp deciduous woods, ravines, banks of streams and canals, on limestone and marl, in mountains up to 2500 m.

**Economic importance.** *M. longifolia* (L.) Huds. s. l. has long been in cultivation. It is used as seasoning (for green cheese, etc.) and is valued for its essential oil and its nectar. It is used in the pharmacological, soap and perfume industries; it also finds application in confectionery and liqueur production. The oil contains menthol and eugenol, the latter has antiseptic and analgesic properties and is used in dentistry. The Caucasian variety is used as condiment and is esteemed for its oil, the output of which amounts in the Caucasus to 0.23–1.1%; the oil contains pulegone (40%), menthol and menthone. According to Kuliev, Caucasian mint is an excellent honey plant, yielding 0.42 mg of nectar per day. One hectare of uniform mint stand gives 169 kg of honey. Nectar production from 1 hectare of mint crop amounts throughout the summer to 336 kg, with a sugar content of 118 kg. The leaves of Caucasian mint contain 81.2 to 147.4 mg% vitamin C. It is established in cultivation.

Various hybrids have been recorded: *M. longifolia* × *M. rotundifolia*, described as separate species (*M. niliaca* Jacq., *M. villosa* Huds., *M. nemorosa* Willd., etc.), *M. longifolia* × *M. aquatica* (*M. dumetorum* Schult.); *M. longifolia* × *M. arvensis*, occurring in E. Europe.

Series 2. *Asiaticae* Boriss. — Calyx campanulate, usually with appressed hairs, the teeth linear, one-quarter to one-third the length of the tube; hairs composing the indument usually short, obscurely articulate, without constrictions, gradually attenuate; leaves usually rather small, mostly oblong to elliptical, cinereous-glaucous on both sides, velutinous with short fine indument or tomentose with short crisp hairs.

9. *M. asiatica* Boriss. sp. n. in Bot. mat. gerb. inst. AN SSSR, XVI (1954). — *M. sylvestris* auct. fl. As. Med.

Perennial, (40) 50–100 cm long, minutely puberulent all over; stems mostly slender, obtusely 4-angled; leaves velutinous or finely tomentose on both sides, greenish or glaucescent (the hairs short, fine, few-celled, without marked constrictions, usually appressed), copiously glandular beneath, with fine elongate teeth or sparsely evenly and shallowly dentate, sessile or short-petioled, rounded or short-cuneate at base, oblong

to elliptical or oblong-lanceolate, rather thin, sometimes shorter than internodes, occasionally conduplicate and recurved; floral leaves subulate, exceeding the verticillasters; inflorescences dense or fairly loose, 4–8 cm long, ca. 10 mm broad, the lower verticillasters sometimes distant; bracts subulate, about equaling the calyx; calyx 1.5–2 mm long, campanulate or infundibular, the teeth linear, one-third to one-fourth the length of the tube, densely covered outside with short appressed hairs and round pale glands; corolla 4–5 mm long, the lobes hairy outside, the upper ca. 2 mm long and 1 mm broad; lower lip 3-lobed, the lobes 1 mm long, 0.75 mm broad; stamens exserted in staminate flowers, included in pistillate; stigma 2-lobed; nutlets ovoid, 0.75 mm long, 0.5 mm broad, hairy at apex, finely alveolate. Fl. June–July; fr. July–August.

River banks, slopes, pebbly river beds, irrigation ditches, meadows. — W. Siberia: Alt.; Centr. Asia: Balkh., T. Sh., Pam.-Al., Syr D., Amu D., Dzu.-Tarb., Mtn. Turkm. **Gen. distr.:** Iran, Dzu.-Kash. Described from Saur range. Type in Leningrad.

**Note.** A very polymorphic, widespread plant. Some of the characters distinguishing it from *M. longifolia* (L.) Huds. are: obtusely (not sharply) angled stems; leaves short-petioled or sessile, sometimes reflexed and conduplicate, often shorter than internodes; fine velutinous indument of leaves and stems; leaves with sparser, more even and shallower dentation; inflorescences rather slender and loose; calyx with appressed hairs, with teeth one-fourth to one-third the length of the tube; corolla 4–5 mm long.

10. *M. vagans* Boriss. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954). — *M. stenostachya* Nevski in Tr. Bot. inst. AN SSSR, 1, 4 (1937) 328, non Richter, (1889); 615 non *M. sylvestris* var. *stenostachya* Boiss. Fl. or. IV (1879) 543.

Perennial, densely whitish-tomentose; stems 40–80 (100) cm long, branched nearly from base, the internodes twice as long as leaves; branches long, divaricate, in corymbose arrangement; leaves tomentose or velutinous on both sides, whitish-glaucous beneath, glaucescent or whitish-glaucous above, ovate or elliptical to oblong or oblong-lanceolate, 1–3 (5) cm long, 1–2 cm broad, mostly sessile, rarely on petiole 1–2 mm long, sometimes conduplicated and reflexed, with undulate or coarsely serrate-dentate margin, subobtuse or acute, cordate at base, often recurved; inflorescence slender, 3–5 cm long, ca. 10 mm broad, spiciform-cylindrical, sometimes interrupted below, mostly solitary, not crowded; some inflorescences often with dioecious flowers; bracts filiform; pedicels short, pubescent; calyx campanulate, 1–2 mm long, white with long implexed hairs, the teeth triangular, acute, broad or acuminate, lanceolate, one-third to one-half the length of the tube; corolla ca. 3 mm long, lilac, hairy outside; stamens about 1 mm longer than corolla; nutlets ca. 0.6 mm long, 0.5 mm broad, ovoid, alveolate, brown, hairy at apex. June–September.

Caucasus: S. Transc.; Centr. Asia: Mtn. Turkm. (Kopetdag range), Pam.-Al. (Kugitang, Gissar range). **Gen. distr.:** Iran. Described from Kugitang range. Type in Leningrad.

**Note.** Nevskii incorrectly identified the Kugitang plant with *M. sylvestris* var. *stenostachya* Boiss. The latter appellation refers to the Mediterranean species *M. tomentosa* Urv. (Enum. pl. 1822, 67) = *M. sieberi* C. Koch (in Linnaea, 21, 1848, 649) = *M. incana* Willd. (Enum. pl. hort. reg. Ber. 1809, 609) = *M. microphylla* C. Koch (in Linnaea, XXI, 1848, 648) and *M. niliaca* auct. non Jacq.

*M. tomentosa* Urv., a very distinctive plant, described from Greece, with relatively small leaves and very slender, long, interrupted inflorescences. The plant described by Richter in 1889 from Hungary as *M. stenostachya* Richter corresponds to European forms of *M. longifolia* (L.) Huds. s. l.

11. *M. alaica* Boriss. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954). — *M. silvestris* auct. fl. As. Med.

Perennial, ca. 1 m high, with a long creeping rhizome; stems simple, branched only in inflorescence, robust, obtusely 4-angled and finely pubescent in upper part, sulcate and glabrous or nearly so in lower part; leaves subsessile, large, gradually smaller toward summit, ca. 3 mm [sic] long, the lower to 10 cm long, broadest (3.5 cm) in the lower third, all leaves oblong-lanceolate, finely puberulent glaucescent above, glaucous  
616 beneath with very dense velutinous pubescence, acuminate, finely serrate-dentate with curved teeth, mostly rounded at base, with axillary fascicles; verticillasters many-flowered, crowded in a spikelike terminal inflorescence 10–20 cm long and ca. 2 cm broad; lateral inflorescences much shorter, in the axils of 2 or 3 uppermost pairs of leaves; all verticillasters more or less distant; floral leaves filiform, acuminate, exceeding the whorls, arcuate, covered with long fine white hairs; pedicels one-half to two-thirds the length of calyx, covered with short subappressed white hairs; peduncles very short, sometimes branched, dark red as are pedicels and partly calyces; calyx 3.25–3.5 mm long, campanulate-infundibular, with implexed hairs, the teeth lanceolate, acuminate, broadly triangular at base, one-third to one-half the length of the tube; corolla lilac (?), creamy when dry, with erect lobes, ca. 6 mm long, glabrous outside and inside or with very scanty hairs only on the broadest lobe (this 1.3 mm broad); all corolla-lobes more or less emarginate, unequal; stamens exserted about 2.5 mm, erect, subequal; anthers parallel; style long, exserted; stigma unequally lobed; nutlets ca.  $\frac{3}{4}$  mm long, ca. 0.5 mm broad, ovoid, slightly attenuate at apex, alveolate, glabrous or obsoletely glandular at apex. July.

Thickets. — Centr. Asia: Pam.-Al. (Alai range). Endemic. Described from Kulyanka-Tugai reserve, between Sufi-Kurgan and Gul'cha. Type in Leningrad.

Note. The characters distinguishing this species from *M. asiatica* Boriss. are: size of inflorescence and corolla (this largest among all species of the section *Spicatae*), shape of corolla-lobes (emarginate and almost glabrous), indument, size of calyx and shape of calyx-teeth, hairless nutlets glandular at apex, and general aspect.

12. *M. darvasica* Boriss. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954). — *M. longifolia* auct. fl. As. Med.

Perennial, with creeping rhizome; stems (15) 20–30 cm long, slightly assurgent, simple or branched from base, slender, curved, obtusely 4-angled; all plant parts densely grayish-tomentose with short soft white hairs; leaves opposite, on petiole 1–3 mm long, ovate to oblong-ovate, 10–30 mm long, 10–12 mm broad, rounded at base, subobtuse or short-acuminate, shallowly dentate from base to apex, very densely covered (more densely beneath) with short crisp hairs, prominently veined  
17 and profusely covered with pale yellow glands beneath, with impressed veins above;



inflorescence terminal, dense, leafless, spikelike, 2–5 cm long, 5–10 mm broad; bracts filiform, the lowest longer but not exceeding width of inflorescence; pedicels densely hairy, the lower longer but not exceeding calyx; uppermost flowers subsessile; calyx ca. 2 mm long and 2 mm broad, broadly short-campanulate, with stiff spreading hairs, the teeth ca. 0.5 mm long, acute from broad triangular base; corolla ca. 4.5 mm long, whitish when dry, hairy outside; lower lip with 3 equal oblong lobes 2 mm long; upper lip as long as the lower, with somewhat broader lobes; stamens slightly shorter than corolla, with parallel anthers; style about equaling corolla; lobes of stigma linear, unequal, one twice as long as the other; nutlets ovoid, ca. 0.75 mm long and 0.5 mm broad, alveolate, brown, glandular and white-haired at apex. Fl. and fr. September.

Middle zone of mountains. — Centr. Asia: Pam.-Al. (Darvaz). Endemic. Described from Darvaz. Type in Leningrad.

Note. Distinguishable from other species of the section by the small, broadly campanulate, hairy calyx, with very short, broad teeth; copiously hairy corolla; short, slender inflorescence; small, thin, mostly ovate, round-based, short-petioled leaves; fine, soft indument; also some additional characters.

13. *M. pamiroalaica* Boriss. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954). — *M. silvestris* auct. fl. As. Med. — *M. royleana* Nevski in Tr. Bot. inst. AN SSSR, 1, 4 (1937) 328, non Benth. (1830).

Perennial, 60–160 cm high, glaucescent with very short pubescence; stems weak, obtusely 4-angled, sulcate, sparingly branched in lower part; leaves with slender petiole 7–10 mm long, oblong to oblong-lanceolate, 1.5–10 cm long, (1) 2–3 cm broad, rather shallowly dentate, sometimes with blunt and curved teeth, greenish above, finely puberulent or subglabrous, on the lower side glandular and covered (mainly on veins and at margin) with very short soft hairs, subacute, with rounded, cuneate or cordate base; inflorescences terminal and lateral, slightly branched in upper part, 2–5 cm long, 0.5–0.8 cm broad, rather loose; bracts linear, acuminate, pubescent, the lowermost longer than the flowers; verticillasters rounded, disposed in lower part of the inflores-  
618 cence; pedicels as long as or longer than calyx, glandular and sparsely hairy, or flowers subsessile; calyx campanulate, 1.5–2 (2.5) mm long, sparsely or rather copiously covered with short spreading hairs and round yellow glands; calyx-teeth triangular-lanceolate, acute, ciliate, sparsely covered with spreading hairs (these longer than on the tube), half the length of the tube, unequal, the longest ca. 1 mm long, the shortest less than 0.5 mm long, the others about 0.5 mm; corolla (?) lilac, 4–5 mm long, with tube 2.5–3 mm long, the uppermost lobe emarginate, shorter and broader than the middle lobe of lower lip, as long as the lateral lobes; middle lobe of lower lip ca. 2 mm long, oblong, exceeding the lateral lobes; stamens and style exceeding the corolla; nutlets small, subglobose-ovoid, ca. 0.75 mm long and ca. 0.5 mm broad, alveolate, brown, sparsely hairy at apex. July.

Very wet taluses of northern slopes, at altitudes between 1300 and 1400 m, near outlets of ground water. — Centr. Asia: Pam.-Al. (Gissar range, Kugitang). Endemic. Described from the basin of river Sangardak in Gissar range. Type in Leningrad.

Note. Differing from *M. kopetdaghensis* Boriss. in petiolate (not sessile) leaves, longer corolla (4–5 mm long, not 2.5–2.75 mm), more slender inflorescences (0.5–0.8 cm broad, not about 10 mm), and subglobose-ovoid (not globose) nutlets.

*M. royleana* Benth., with which Nevskii identified the Kugitang plant, is widely distributed in N. W. India (whence described) and Afghanistan. It differs in its leaves being small, narrow, triangular-lanceolate, acuminate, broadest at the cordate base, deeply dentate-serrate, mostly green above, densely white-haired beneath; inflorescence long, slender, interrupted in lower part, with crowded small-flowered verticillasters above.

14. *M. kopetdaghensis* Boriss. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).—*M. silvestris* auct. fl. As. Med.

Perennial, (50) 80–150 cm high, glaucous-green, with long creeping rhizome; stems robust, obtusely 4-angled, finely velutinous-pubescent, especially in upper part, subglabrous below, woody at base, simple, with weak lateral shoot in the axils of upper leaves; leaves sessile, cordate at base, lanceolate, 8–12 cm long, 2.5–3 cm broad, with uneven recurved teeth in lower and in upper third, acute, glaucescent above with scattered flat (under magnifying glass) fleecy hairs, glaucous with copious flexuous flat hairs and profusely glandular beneath; inflorescence terminal, on a fairly long peduncle, 619 simple, 4–7 cm long, 8–10 mm broad, many-flowered, sometimes interrupted in lower part; smaller lateral clusters sometimes arising from axils of upper leaves, in conical buds; floral leaves filiform, acute, equaling or exceeding the many-flowered verticillasters; pedicels one-and-a-half times as long as calyx, with spreading short hairs; calyx infundibular, 1–2 mm long, densely covered with short spreading hairs and numerous round yellow glands, the teeth linear, three of them 0.5 mm long and two ca. 1 mm; corolla lilac, 2.5–2.75 mm long, densely hairy and glandular outside, the uppermost lobe scarcely to slightly emarginate, ca. 1 mm long and 0.5 mm broad, with a large dark-lilac horse-shoe-shaped spot; stamens exceeding corolla by 1.5 mm; anthers parallel, rounded, lilac; style long, exceeding the stamens, sometimes equaling the corolla and thickened; lobes of stigma short, unequal; nutlets subglobose, 0.5 mm long and ca. 0.5 mm broad, obtuse and hairy at apex, brown, alveolate. May–June.

Mountain gullies, near water, and dry waterways in gravelly foothills. — Centr. Asia: Mtn. Turkm. (Kopetdag, Bol'shie Balkhany). **Gen. distr.:** Iran. Described from Chuli gorge. Type in Leningrad.

Note. The characters distinguishing *M. kopetdaghensis* from *M. asiatica* and other related species are: corolla ca. 2–2.75 mm long (not 3–6 mm), calyx 1–2 mm long, simple unbranched stems, mostly solitary inflorescence, and large, oblong-lanceolate sessile leaves, mostly finely puberulent beneath.

15. *M. interrupta* Boriss. in Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954). — *M. asiatica* Boriss. X *M. arvensis* L.

Perennial, 60–170 cm high; stems 4-angled, finely pubescent, branched in upper part; leaves oblong or lance-oblong, acute, short-cuneate at base, petiolate, sharply and unevenly serrate-dentate, sparsely and minutely puberulent above, densely pubescent and prominently veined beneath; lower floral leaves resembling the cauline, the upper progressively smaller and becoming lanceolate to linear or all floral leaves filiform-subulate, mostly exceeding the verticillasters; inflorescence 10–20 cm long; verticillasters dense, rounded, all or only the lower distant; bracts small, inconspicuous; pedicels short, subglabrous

at base or hairy; calyx ca. 2 mm long, campanulate, covered with short spreading hairs, the teeth lanceolate, acute from broad base, one-quarter to one-half the length of the tube; 620 corolla 3.5 mm long, hairy and glandular outside, with a long slender tube; stamens mostly abortive, much shorter than corolla and only reaching the throat, more rarely exerted; pistil exerted, with 2-lobed stigma; nutlets ovoid, ca. 1 mm long, 0.5 mm broad, alveolate, hairy at apex. Fl. July–August; fr. August.

Near water, banks of river and irrigation ditches. — Centr. Asia: T. Sh. Endemic. Described from the vicinity of Alma Ata. Type in Leningrad.

Note. This is a hybrid derived from *M. asiatica* Boriss. and *M. arvensis* L. Some of the characters distinguishing it from *M. asiatica* are: long, interrupted inflorescence, to 10–20 cm long; floral leaves resembling the cauline, progressively smaller toward summit, the upper subulate; different leaf dentation.

Series 3. *Virides* Boriss. — Calyx campanulate or tubular-campanulate, with triangular-lanceolate teeth; plants glabrous or nearly so; leaves sessile or petiolate, glabrous or with few setiform hairs on the veins, dark green; cultivated plants.

16. *M. piperita* L. Sp. pl. (1753) 576; Benth. Lab. Gen. et sp. 175 Benth. in DC. Prodr. XII, 169; Maevskii, Fl. (1940) 537. — *M. silvestris* var. *piperita* Schmalh. Fl. II (1897) 307. — Ic.: Varlikh, Russk. lekarstv. rast. 90; Syreishch. Fl. Mosk. gub. III, 72; Komarov, Sbor., sushka i razved. lekarstv. rast. 31.

Perennial; rhizome horizontal; stems 30–100 cm long, assurgent at base, erect, branched, often reddish, glabrous or with sparse short setiform hairs mostly on the angles; leaves with petiole 6–8 mm long, ovate-oblong to sub lanceolate, 3–8 cm long, 1.5–2 cm broad, glabrous or with short setiform hairs on the veins beneath, dark green, densely punctate-glandular beneath, sharply dentate with long uneven teeth, rounded at base, acuminate; floral leaves resembling the cauline, smaller; inflorescences at ends of stems and branches, capitate-spicate, short and broad, interrupted at base; bracts narrow, setaceous, ciliate, glabrous at base, the lower longer than verticillasters, the upper shorter; calyx tubular, glabrous, violet-tinged, punctate-glandular, the teeth erect, not connivent in fruit, ciliate, one-third the length of the tube; corolla glabrous, the tube whitish, about as long as calyx, the limb pink or lilac; stamens shorter than corolla; style exerted; nutlets obovoid, ca. 0.75 mm long, 0.5 mm broad, dark brown, glandular at apex. July–September.

Cultivated, in gardens and truck-gardens, sometimes naturalized. — European part: U. Dnp., M. Dnp., Bl., L. Don; Caucasus: Cisc.; Centr. Asia: T. Sh., Mtn. Turkm. Gen. 621 distr.: Centr. and Atl. Eur., Med., Ind.-Him., China, Japan. Described from England. Type in London.

The plant has been cultivated for a long time in France, England (an improved variety — *M. piperita anglica vera*), Italy, Holland, and other countries. *M. piperita* L. em. Huds. is a cross between *M. aquatica* and *M. spicata*.

**Economic importance.** Peppermint is propagated vegetatively and numerous varieties are known. It is grown for its medicinal value (*Foliae Menthae piperitae*, *Oleum Menthae piperitae*) and for its essential oil. The oil (brand No. 541) contains menthol, citral,



geraniol, dihydrocarvone and carvone; the chemical composition differs according to variety. Oil content is highest in inflorescences, lower in leaves, lowest in stems. It is affected by time of harvest, plant age and origin. The oil contains 38–65% menthol. Varieties with a high menthol content (No. 451 and hybrid No. 272) have been produced. The leaves are used in infusions and decoctions for their stomachic and anodyne effects. The oil is used to enhance the palatability of other medicaments; it is also applied externally for a variety of ailments (rheumatism, neuralgia, etc.). The Soviet Union is among the leading producers of peppermint oil. The plant contains vitamin A; it is nectariferous; it is also used in liqueur, food and perfume industries.

Bergamot mint (*M. citrata* Ehrh. Beitr. 7, 1792, 150), cultivated in W. Europe and N. America, has a very strong and agreeable scent. It is distinguishable by its leaves being petiolate, broadly ovate to suborbicular, the lower ones obtuse; as opposed to *M. piperita*, the calyx-lobes of this mint are not ciliate.

17. *M. spicata* L. Sp. pl. (1753) 576, p. p. em. Huds. Fl. Angl. (1762) 22; Grossg. Fl. Kavk. III, 348. — *M. spicata*  $\alpha$ . *viridis* L. Sp. pl. (1753) 576. — *M. viridis* L. Sp. pl. (1762) 804; Benth. in DC. Prodr. XII, 168 et Lab. Gen. et sp. 173; Ldb. Fl. Ross. III, 337. — *M. silvestris* var. *viridis* Garcke ex Boiss. Fl. or. IV (1879) 544; Shmal'g. Fl. II, 307. — Ic.: Syreishch. Fl. Mosk. gub. III, 71; Rochel in Linnaea, XII, tab. 6, No. 6.

Perennial; stems erect, 40–90 cm long, glabrous or nearly so, green; sterile shoots only underground; leaves subsessile to sessile or short-petioled, glabrous or nearly so, ovate-oblong or oblong-lanceolate, sharply and unevenly serrate or dentate, acuminate, faintly netted-veined; inflorescences slender, cylindrical, spikelike, compact, interrupted; verticillasters distant or the upper approximate; floral leaves resembling the bracts, not  
622 exceeding the calyx; calyx glabrous, slightly constricted at throat in fruit, the teeth triangular, equal, slightly connivent. July–September.

River banks, meadows and fields. Widely cultivated and naturalized, sometimes occurring as a weed. — European part: U. Dns., M. Dnp., Bl., Crim., Bes.; Caucasus: Cisc., W. Transc.; W. Siberia: Alt.; Centr. Asia; Mtn. Turkm. Gen. distr.: S. Eur., W. and E. Med., Canary Islands, Madeira. Described from Europe. Type in London.

Note. Hybrids have been recorded: see pages 434, 446.

**Economic importance.** The plant yields essential oil (*Oleum Menthae viridis*).

18. *M. crispata* Schrad. ex Willd. Enum. hort. Berol. (1809) 608; Stank. and Tal. Opred. 841. — *M. silvestris* var. *crispata* Schmalh. Fl. II (1897) 307. — Ic.: Schlechtend. et Guimpel. Abb. Pharm. Boruss. Gew. II, tab. 108.

Perennial, glabrous, 30–60 cm high; sterile shoots only underground; leaves ovate or lanceolate, coarsely and unevenly serrate and deeply dentate, rugose, with crisped margin, faintly netted-veined, sessile or subsessile, sometimes softly white-pubescent beneath; verticillasters approximate, forming dense leafless cylindrical terminal clusters; calyx somewhat constricted at throat in fruit, the teeth slightly connivent. Fl. July–August.

Cultivated in gardens in the European part. Described from Europe. Type in Berlin.

Series 4. *Rotundifoliae* Malinv. ex Briq. in Pflanzenfam. IV, 3a (1897) 322 (emend.). — Calyx broadly campanulate, to 1.5 mm long, with lance-subulate teeth; inflorescence slender, 6–8 mm broad, dense; leaves ovate or orbicular, crenate or crenate-dentate, sometimes rugose and thickish, obtuse or short-acuminate, more or less pubescent (mainly beneath).

19. *M. rotundifolia* (L.) Huds. Fl. Angl. (1762) 221; L. Sp. pl. (1763) 805; Ldb. Fl. Ross. III, 337; Benth. Lab. Gen. et sp. 173 et in DC. Prodr. XII, 167; Shmal'g. Fl. II, 306; Grossg. Fl. Kavk. III, 348. — *M. spicata* γ. *rotundifolia* L. Sp. pl. (1753) 576. — *M. neglecta* Ten. Fl. Nap. 2 (1811–1838) 379. — *M. rugosa* Lam. Fl. Fr. 2 (1805) 240. — Ic.: Hegi, III. Fl. V, 4, fig. 3229; Ten. Fl. Nap. tab. 157, fig. 1; Rochel in Linnaea, XII, tab. 6, No. 2.

- 623 Perennial, with underground and aerial sterile shoots; stems erect, lanate, 30–80 cm long, paniculately branched in upper part; leaves usually sessile, rounded-cordate at base, more rarely elliptical, ovate or rounded-ovate, 20–30 (50) mm long, 15–25 mm broad, crenate or crenate-dentate, pubescent above, whitish-tomentose beneath, rugose, thickish, obtuse, rarely subacute; inflorescences ca. 6 mm broad, dense, cylindrical, terminal, leafless, spikelike, sometimes nodding, mostly interrupted at base; bracts lanceolate; pedicels subglabrous or pubescent; calyx ca. 1.5 mm long, campanulate, pubescent, obscurely nerved in fruit, subglobose, inflated, not constricted at throat, the teeth short, lance-subulate, acute, connivent, the throat glabrous; corolla ca. 2.5 mm long, whitish, light lilac, pale violet or lilac; fertile stamens exserted, sterile included in the tube; nutlets ca. 0.5 mm long and as broad, globose, dark brown, alveolate, glabrous. July–August.

Cultivated, occasionally naturalized along canals and at roadsides. — W. Siberia: Alt. (Altai and along River Irtysh); Centr. Asia: T. Sh., Mtn. Turkm. **Gen. distr.:** Centr. and Atl. Eur., Med. Described from Europe. Type in London.

Note. The following crosses between *M. rotundifolia* and other species have been recorded:

- 1) *M. rotundifolia* × *M. longifolia* (see p. 440), occurring in Crimea and in Centr. and Atl. Europe.
- 2) *M. rotundifolia* × *M. sativa* — in Centr. and Atl. Europe.
- 3) *M. rotundifolia* × *M. aquatica*, described as *M. pyramidalis* Ten., *M. sua-vis* Guss.
- 4) *M. rotundifolia* × *M. arvensis*, described as *M. carinthiaca* Host.; sometimes occurring in Centr. and Atl. Europe.

Subgenus 2. **Pulegium** (Mill.) Boriss. comb. n. — Genus *Pulegium* Mill. Gard. Dict. VIII (1768). — Sect. *Pulegium* (Mill.) Cos. et Germ. Flore des env. de Paris, I (1845) 316; Gren. et Godr. Flore de France, II, 653. — Genus *Audibertia* Benth. in Bot. Reg. sub. No. 1282 (1829). — Genus *Menthella* Pérard. in Bull. Soc. Bot. Fr. XVII (1870) 205. — Calyx bilabiate, the lower lip with two subulate teeth, the upper lip shorter, with three short triangular teeth, tubular or campanulate-tubular, the throat

hairy, closed in fruit, the tube setiferous, strongly sulcate, somewhat curved; corolla with 4 unequal entire lobes, glabrous inside, mostly hairy outside, gibbous at throat; nutlets ovoid or globose, ca. 0.5 mm in diameter, glabrous, not attenuate toward apex. 624 Plants 15–30 (50) cm high, mostly annual, branched from base.

*Pulegium* is a Mediterranean subgenus, distributed in S. Europe, Caucasus and N. Africa. Some species are cultivated for their aromatic essential oil; they are used for food flavoring and in the perfume industry.

20. *M. pulegium* L. Sp. pl. (1753) 577; DC. Prodr. XII, 175; M. B. Fl. taur.-cauc. II, 46; Ldb. Fl. Ross. III, 340; Benth. Lab. Gen. et sp. 182; C. A. M. Enum. pl. cauc.-casp. 91; Boiss. Fl. or. IV, 545; O. and B. Fedch. Perech. rast. Turk. V, 125; Fedch. and Fler. Fl. 836; Shmal'g. Fl. II, 308; Briq. in Pflanzenfam. IV, 3a, 318; Grossg. Fl. Kavk. III, 347. — *Pulegium vulgare* Mill. Gard. Dict. ed. VIII (1788) No. 1. — *P. tauricum* Gdgr. in Bull. Soc. Nat. Mosc. (1880–1882) 188; Gand. Men-thae nov. 7, 12. — Ic.: Briq. l. c. fig. 98, L–M, 101 A; Hegi, III. Fl. V, 4, fig. 3222; tab. 224, fig. 1. — Exs.: Fl. exs. Austro-Hung. No. 645.

Perennial, hairy; stems erect and prostrate, strongly branched, 15–30 (50) cm long, with rooting branches; leaves on petiole 2–4 mm long, oval or ovate, 8–25 mm long, 5–12 mm broad, entire or mostly slightly dentate, obtuse, long-haired, prominently veined beneath; floral leaves sessile, shorter than flowers, often recurved, small; flowers in axillary umbels; inflorescences remote, globular, 12–15 mm broad; verticillasters numerous, many-flowered, the lower more distant, somewhat shorter to longer than leaves, on short stout peduncles; pedicels stout, curved, setiferous; traets ovate; calyx ca. 3 mm long, setiferous, bilabiate, hairy inside, the lower teeth subulate, the upper lanceolate and broadly triangular, ca. 1 mm long; corolla bright pink, rose-lilac or white, 5–7 mm long, twice length of calyx, slightly gibbous at throat, abruptly narrowed below into the tube, hairy outside; the lobes not emarginate, three of them oblong and one lanceolate; stamens exserted; anthers oblong; style about equaling or slightly exceeding corolla; nutlets globose, small, ca. 0.5 mm in diameter, slightly keeled on one side. June–September.

627 Wet boggy places, roadsides, pond banks, limestone and marl, in the forest-steppe and steppe zones. — European part: U. Dns. (rare), Bl., Bes., Crim.; Caucasus: Cisc., W., E. and S. Transc., Tal.; Centr. Asia: Syr D. (cultivated in the Tashkent area), Mtn. Turkm. (Ashkhabad). **Gen. distr.:** Med., Asia Minor, Centr. Europe. Described from Europe. Type in London.

21. *M. daghestanica* Boriss. sp. n. Bot. mat. gerb. Bot. inst. AN SSSR, XVI (1954).

Perennial, spreading, short-haired, with assurgent stems; leaves ovate-orbicular, 5–10 mm long, 3–6 mm broad, obtuse, obscurely dentate, the petiole very short; bracts ovate; flowers small; verticillasters numerous, 5–7 (10) mm broad; calyx ca. 1.5 mm long, densely hairy in throat, the upper teeth short and broad, the lower subulate-lanceolate; corolla ca. 4.5 mm long, bilabiate, hairy outside, the lower lip 3-lobed, with unequal oblong lobes, the upper lip with one lanceolate lobe; nutlets globose, small, ca. 0.75 mm long, 0.5 mm broad. — Caucasus: Dag. Endemic. Described from Dagestan. Type in Leningrad.





PLATE XXXII. 1 – *Mentha micrantha* Fisch., general aspect, flower, fragment of calyx inside, calyx with bract, corolla, nutlet; 2 – *M. dahurica* Fisch., upper part of stem, calyx, corolla, nutlet; 3 – *M. arvensis* L., upper part of stem, calyx, nutlet, corolla; 4 – *M. longifolia* (L.) Huds. ssp. *caucasica* Briq., part of inflorescence, flower, calyx, corolla, nutlet.

Note. Related to *M. pulegium*; distinguished from it by narrower whorls (5–7 (10) mm broad as against 12–15), calyx 1.5 mm long (not 3 mm), short and broad upper calyx-teeth (not lance-triangular), rounded-ovate leaves, 5–10 mm long and 3–6 mm broad (not ovate, 8–25 mm long and 5–12 mm broad); there are also differences in indument and other characters. Closely related strains from Algeria and Tunisia are covered with short retrorse hairs; they have oblong petiolate leaves, rather deeply dentate; their calyx has a narrow tube, three broadly lanceolate acute teeth and two subulate teeth.

*M. gibraltarica* Willd. of S. Spain and Algeria is characterized by the following features: a tomentose indument consisting of long white hairs; flowers with very short pedicel or almost sessile, crowded in upper part of the plant in large globular inflorescences; flowers white, ca. 8 mm long; corolla-tube and corolla-lobes elongate.

22. *M. micrantha* Fisch. in herb.; Fl. Yugo-Vost. VI, 180. — *M. pulegium* var. *micrantha* (Fisch.) Benth. in DC. Prodr. XII (1848) 175; Ldb. Fl. Ross. III, 340; O. and B. Fedch. Perech. rast. Turk. V, 126; Grossg. Fl. Kavk. III, 348. — *M. pulegium* var. *micranthum* (Fisch.) Briq. in Pflanzenfam. IV, 3a (1837) 318; Shmal'g. Fl. II, 308. — *Pulegium micranthum* (Fisch.) Claus in Beitr. Pfl. Russ. R. (1851) 244. — *Pulegium deserticola* Claus in herb. — Exs.: GRF, No. 1532a, No. 1532b.
- 628 Annual, weak, small plants, 12–30 cm high; stems erect, 4-angled, glabrous, branched from base; radicant shoots absent; leaves glabrous, almost entire, with petiole ca. 5 mm long, oblong or ovate-oblong or ovate, acute, the lower 10–20 mm long, 5–10 mm broad, progressively smaller toward summit, glandular, with 5 prominent veins beneath; verticillasters 7–12 mm broad, short-peduncled, disposed all along stem and branches; bracts linear to linear-lanceolate, about equaling the pedicels, shortly setiferous at margin, as are pedicels and calyces; calyx bilabiate, 2–2.5 mm long, punctate-glandular, the two lower teeth subulate, weakly setiferous, ca. 0.75 mm long, the three upper broadly triangular, ca. 0.5 mm long, the throat hairy; corolla slightly bilabiate, pink, rose-lilac or purple, 3–3.5 (4) mm long, with a long tube, hairy outside, 4-lobed, one of the lobes slightly longer, entire or slightly emarginate, the others subequal, ovate, obtuse; stamens slightly exceeding the corolla, the filaments white, the anthers parallel, dark, rounded; style shorter than corolla; nutlets ovoid or globose, 0.5 mm long, 0.25–0.5 mm broad, smooth, weakly keeled. June–August. (Plate XXXII, Figure 1.)

Steppes, sink holes in steppes. — European part: L. V., L. Don; Caucasus: Cisc.; Centr. Asia: Ar.-Casp. (N. W. Kazakhstan). Described from the River Don. Type in Leningrad.

#### Genus 1302.\* *Gontscharovia*\*\* Boriss.

Boriss. in Bot. mat. gerb. Bot. inst. AN SSSR, XV (1953) 321

Verticillasters few-flowered, forming long, slender, dense racemes; calyx tubular-campanulate, 5-toothed, regular, glabrous in throat, 15-nerved, covered all over with

\* Treatment by A. G. Borisova.

\*\* Named for the Botanist N. F. Goncharov (1900–1942).

setiform hairs and glands; corolla almost regular, with glabrous throat; upper lip not exceeding the lower, emarginate, lower lip equally 3-lobed; stamens 4, of these two longer than corolla, the other two close to upper lip, scarcely exerted from throat; anthers bilocular, ovoid, the locules subparallel; stigma weakly 2-lobed; nutlets oblong, terminating in a laterally bent beak, glabrous. Shrublets, with thickish sessile or sub-  
629 sessile leaves borne on virgate woody shoots; root robust, woody. All parts of the plant covered with reddish punctate glands. Containing essential oil.

Monotypic Central Asian genus, distributed in xerophytic habitats of S. W. Pamiro-Alai.

1. **G. popovii** (B. Fedtsch. et Gontsch.) Boriss. in Bot. mat. gerb. Bot. inst. AN SSSR, XV (1953) 322. — *Satureia popovii* B. Fedtsch. et Gontsch. in Tr. Bot. sada, XLI, 1 (1929) 117.

Shrublet, 20–45 cm high; caudex thick, woody, branched in upper part; roots robust, woody; stems virgate, unbranched or rarely branched (usually as result of injury), often with small-leaved axillary fascicles, assurgent, woody, with brownish bark; annotinous stems mostly flexuous, the sterile usually shorter than the flowering, all very finely pubescent, densely leafy; cauline leaves upright, opposite, coriaceous, minutely hispidulous, the lower glabrous, densely covered on both sides with reddish punctate glands, entire, ovate or elliptical to oblong, more rarely oblong-lanceolate, with somewhat prominent midvein beneath, the lower often ovate, subacute or rounded-obtuse at apex, 10–18 mm long, 4–10 mm broad, the upper much smaller, subsessile, obscurely petiolate or sessile; floral leaves smaller than the cauline, oblong to elliptical or ovate, subobtuse, usually equaling the calyx, the upper often shorter; bracts linear-lanceolate to linear, slightly shorter than calyx-tube, ciliate, subacute; leaves, bracts, calyx and corolla copiously punctate-glandular; verticillasters 3–5-flowered, distant, the lower short-peduncled, the upper sessile or subsessile, forming long racemiform or spiciform inflorescences, sometimes branched; calyx tubular-campanulate, 15-nerved, with glabrous throat, setiferous, glandular, 3.5–4 mm long, regular, 5-toothed, the teeth triangular-lanceolate, acute, two-thirds the length of the tube; corolla 5–7 mm long, whitish-pink, pubescent and glandular outside, the tube ca. 3 mm long and 1 mm broad; upper lip straight, flat or concave, ovate, scarcely emarginate; lower lip 3-lobed, the lobes rounded-ovate, flat, recurved, equal, as long as or somewhat shorter than upper lip; two stamens about equaling the corolla, the outer two shorter, disposed under the upper corolla-lip; anthers ovoid, glabrous, ca. 0.5 mm long, subparallel-divergent; style glabrous, 4–5 mm long; stigma weakly 2-lobed; nutlets glabrous, ob-  
630 long, ca. 1.6 mm long, 0.6 mm broad, produced at apex into a laterally curved beak. June–September. (Plate XXII, Figure 2.)

Mountains, at altitudes between 500 and 2500 m, in rock exposures and crevices, outcrops of limestone and gypsum. — Centr. Asia: Pam.-Al. Endemic. Described from S. W. Tadzhikistan (between villages Kafirmigan and Yavan). Type in Leningrad.

Note. Plant with a strong and pleasant aroma, worth introducing into cultivation.



Subtribe B. Perillinae Briq. in Pflanzenfam. IV, 3a (1895) 208 et 325. — Calyx campanulate or tubular, 5–10-nerved, with 5 equal teeth, at least in fruit bilabiate (3/2 pattern); corolla bilabiate or regular, with flat lobes; stamens 2–4, straight or slightly ascending, didynamous. Herbs.

Genus 1303.\* *Perilla*\*\* L.

L. Gen. ed. VI (1764) 578. — *Dentidia* Lour. Fl. Cochinch. (1790) 369

Flowers borne on short hairy pedicels, aggregated into one-sided axillary racemes and panicles; bracts linear-lanceolate, acute, pubescent; calyx almost regular, campanulate or cupuliform, glabrous in throat, declined in fruit, gibbous, densely villous, bilabiate, 5-parted; upper lip enlarged, 3-toothed, the middle tooth shorter; lower lip 2-toothed; corolla obliquely campanulate, pubescent outside, the limb obscurely bilabiate, 5-lobed; stamens 4, erect, about equaling corolla; anthers divergent; style with deeply 2-parted stigma; nutlets mostly globose, subtriangular in cross-section, slightly flattened, glabrous, reticulated. Herbs, mostly hairy; stem erect, ascending; lower leaves large, ovate, long-petioled; upper leaves oblong-ovate, sessile or minutely petiolate. The genus is composed of 4 species, distributed in E. Asia, India, Japan and China. Two species grow in the U.S.S.R.

1. Corolla white, slightly longer than calyx; nutlets 1.7–2 mm long, 1.7 mm broad; lower leaves broadly ovate, 4.5–8 (12) cm long, 3–6 (7) cm broad, short-acuminate, coarsely serrate-dentate . . . . . 1. *P. ocymoides* L.
  - + Corolla pink or whitish-red, about as long as calyx; nutlets 1.5–1.7 mm long, 1.2–1.5 mm broad; lower leaves ovate or ovate-cuneate, 3–7 cm long, 4–5 cm broad, long-pointed, serrate-crenate and wavy at margin . . . . . 2. *P. nankinensis* (Lour.) Decne.
- 631

1. *P. ocymoides* L. Gen. Pl. ed. VI (1764) 578; Kom. Fl. Man'chzh. III, 388; Kom. and Alis. Opređ. rast. Dal'nevost. kr. II, 909. — Ic.: Bot. Mag. tab. 2395; Somoku-Dzusetsu, Ed. Makino (Ic. Pl. Nippon.) XI, tab. 25; Zakharkin, *Perilla* v Primorsk. kr., Fig. 1, 2; Dobrovol'sk, *Perilla* na Sev. Kavk. Fig. 1–4; G. Ya. Duda, *Perilla*, Fig. 1–5; Kul't. Fl. SSSR, VII, Fig. 142–149.

Annual, 60–100 cm high, hairy, very fragrant; stem erect, stout, obtusely 4-angled, sulcate, mostly dark purple, covered (often profusely) with long colored multicellular hairs; lower leaves large, broad-ovate, 4.5–8 (12) cm long, 3–6 (7) cm broad, green or sometimes brownish-purple, short-pointed, coarsely serrate-dentate, rugose, cuneately narrowed at base, sometimes with petiole 1.5–3.5 cm long; upper leaves 0.6–3 cm long, 0.3–2 cm broad, oblong-ovate; all leaves sparsely covered with long multicellular

\* Treatment by S.G. Gorshkova.

\*\* From the Indian plant name.

hairs, the veins and petiole densely hairy; flowers numerous, aggregated into racemiform inflorescences 3–10 cm long and 0.8–1 (1.5) cm broad, on ascending hairy peduncles 1–1.5 cm long; pedicels short, hairy, mostly horizontally spreading; bracts linear-lanceolate, 3–6 mm long, 0.5–1 mm broad, exceeding the pedicel and sometimes about equaling the corolla, acute, pubescent, ciliate; calyx cupuliform, 3–3.5 mm long, 1.5–1.8 mm broad, accrescent, densely covered with long colored hairs; calyx-teeth acute, the upper ovate, short, 1–1.3 mm long, 0.7 mm broad, the lower lanceolate narrow, 1.8–2 mm long, 0.5 mm broad; corolla white, 3.5–4 mm long, slightly exceeding calyx, pubescent outside, with a ring of hairs in throat; limb obscurely bilabiate, 5-lobed, the upper lobes rounded, 0.5–0.6 mm long, 0.5 mm broad, the lateral 0.4 mm long, 1 mm broad, the middle lobe entire, 1 mm long, 1.8 mm broad; stamens 4, erect, about equaling the corolla; style 1.7–2 mm long, 1.7 mm broad, mostly triangular in cross-section, flattened on one side, yellowish-brown, reticulated, glabrous. July.

Cultivated for its essential oil, sometimes naturalized (Far East) and spreading, chiefly in sandy places along shores of rivers and lakes. — European part: M. Dnp., Transv., Bl. (N. part), L. Don, L. V.; Caucasus: Cisc., W. Transc., Tal.; Far East: Uss. **Gen. distr.:** Ind.-Him., China, Japan. Described from India. Type in London.

**Economic importance.** This plant has been cultivated in the Far East since ancient times. During the last ten years, cultivation of perilla has spread in Ukraine, N. Caucasus and Transcaucasia. The seeds are a source of a drying oil which is used in the paint and varnish, rubber, textile and power industries. Perilla oil also has medicinal properties; it is used in a preparation for the treatment of leprosy. The vegetative parts of both our species contain essential oil that is used in confectionery (Baburina, Kul't. fl. SSSR, VII).

The seed contains 34 to 49% oil; this is composed of 4.0% oleic acid, 53.0% linoleic acid, 23.0% linolenic acid, and unsaturated acids 12.0%; the iodine number is 196.1 (Grossg. Rast. res. Kavk. 519). The refuse from oil extraction is used in the Far East for fishing (Kom. Fl. Man'chzh. III, 388).

2. *P. nankinensis* (Lour.) Decne. in Rev. hort. ser. IV, I (1852) 61; Grossg. Fl. Kavk. III, 349. — *Dentidia nankinensis* Lour. Fl. Cochinch. I (1793) 447. — *Perilla arguta* Benth. in DC. Prodr. XII (1885) 163.

Perennial, to 60–100 cm high; stem erect, strongly branched, mostly purple-tinged, sparsely covered with multicellular hairs; leaves ovate or ovate-cuneate, 7 cm long, 4–5 cm broad, mostly dark red or rufous-purple, long-pointed, serrate-crenate, wavy-margined, the petiole 3–4 cm long; upper leaves (2) 2.5–3.5 cm long, 1.5–2 (2.5) cm broad, oblong-ovate, terminating in a rather long point, serrate-crenate, with petiole 0.5 cm long; all leaves hairy on the veins and at margin; flowers numerous, inflorescences racemiform or spiciform, on hairy peduncle 1–1.5 cm long; pedicels horizontally spreading, pubescent, 2.5 mm long; bracts linear-lanceolate, 3–3.5 mm long, 0.5 mm broad, acute, hairy, ciliate; calyx cupuliform, 3–4 (4.5) mm long, 1 mm broad, accrescent, densely covered with long colored multicellular hairs, the upper teeth ovate, 0.4–0.5 mm long, 0.4 mm broad, subacute, the lower lanceolate, 1.5 mm long, 0.6 mm broad, acute; corolla pink or whitish-red, 3–4.5 mm long, equaling calyx, pubescent outside, with a ring of hairs in throat; limb weakly bilabiate, 5-lobed, the upper lobes

rounded, 0.3–0.5 mm long and as broad, the lateral 0.5–0.6 mm long and broad, similar, the middle lobe rounded-oblong, 0.7 mm long and broad; stamens 4, erect, about equaling the corolla; anthers violet; style 1–2 mm long; stigma 2-parted; nutlets globose, 1.5–1.7 mm long, 1.2–1.5 mm broad, more or less flattened, rufous, reticulated. July–September.

Banks of streams and wet places, adventive; on weed-infested places in the coastal 633 belt. — Caucasus: W. Transc. (Batumi, Kutaisi, Sukhumi). **Gen. distr.:** Ind.-Him., China, Japan, N. Am. Described from Nanking. Type in Paris.

**Economic importance.** Cultivated for ornament and for essential oil extraction in the European part of the U.S.S.R. (except N. regions) and throughout W. Europe.

### Genus 1304.\* **Orthodon\*\*** Benth.

Benth, ex Oliver in Journ. Linn. Soc. IX (1876) 167. — Mosla Hamilt. ex Maxim. in Bull. Acad. Sc. Pétersb. XX (1875) 458

Flowers 3.5 (4) mm long, rose-violet; inflorescences at ends of stem and branches, slender, racemiform, composed of 2-flowered whorls; calyx slightly and shortly scabrous, convex anteriorly at base, bilabiate, with a ring of hairs at margin inside, the three upper teeth broader, ovate, short-acuminate to subobtusate, the lower teeth longer, lanceolate, acute; corolla small, with 4-lobed limb; upper lip short, undivided, semi-orbicular; lower lip with a longer middle lobe and very short suborbicular lateral lobes; stamens 4, of these two fertile, slightly exerted, the other two barren; leaves copiously punctate-glandular, coarsely serrate, point-tipped, cuneately narrowed at base, entire; nutlets obovoid-globose, reticulate-rugose. Annuals, strongly aromatic; stem erect, branched, rarely simple. Up to ten species.

1. **O. grosseserratum** (Maxim.) Kudo, Lab. Sinojapon. Prodr. (1929) 79. — *M. grosseserrata* Maxim. in Bull. Acad. Sc. Pétersb. XX (1875) 458; Kom. Fl. Man'chzh. III, 391; Kom. and Alis. Oprod. rast. Dal'nevost. kr. II, 890; Grosssg. Fl. Kavk. III, 349. — **Ic.:** Somoku-Dzusetsu, Ic. pl. Nippon, tab. 17.

Annual, 10–60 (70) cm high; stem slender, erect, branched, rarely simple, slightly scaberulous to subglabrous; branches spreading; leaves ovate- to oblong-rhomboid, coarsely serrate, entire at base, distinctly petiolate, with 3–5 small teeth at margins and a larger tooth at apex (sometimes with 1 or 2 small teeth); main stem and lateral branches terminating in leafless racemes, these composed of 2-flowered axillary whorls; bracts very small, 2.5 mm long, linear-lanceolate, with short-ciliate margin; calyx 2–3 mm long, short-haired, bilabiate, the three upper teeth broader (the middle of them 634 half times as long as the uncleft part; corolla 3.5–4 mm long; upper lip shortly rounded, twice as long as the middle lobe of lower lip; fertile stamens slightly exerted, the two

\* Treatment by E. V. Volkova.

\*\* From Greek *orthos*, straight, and *odons*, tooth.



sterile stamens shorter, included in corolla; nutlets obovoid-globose, reticulate-rugose, 1 mm long. July–August.

A weed (in Caucasian tea plantations), river banks, thickets, sedge and reedgrass meadows in proximity of springs. — Caucasus: W. Transc.; Far East: Uss., Sakh. (Kurile Islands). **Gen. distr.:** China (Manchuria), Korea, Japan. Described from Japan. Type in Leningrad.

Tribe 7. **POGOSTEMONEAE** Rchb. Nom. (1841) 104; Briq. in Pflanzenfam. IV, 3a (1895) 208 et 326. — Calyx mostly with 5 equal teeth; corolla with tube mostly included in calyx and subequally 4–5-lobed limb, or bilabiate of the 2/3 pattern; stamens 4, mostly exserted from corolla-tube, divergent, erect or slightly curved; anthers subglobose, the locules spreading, coalescent at apex, after dehiscence disposed in one plane.

**Genus 1305.\* Elsholzia\*\* Willd.**

Willd. in Roem. et Usteri Mag. IV (1790) XI 3; Sp. pl. III, 59.

Calyx ovoid or campanulate, membranous, glandular, densely pubescent or villous, 5-toothed, the teeth narrowly lanceolate or almost subulate; corolla puberulent, lilac or reddish-violet, tubular-campanulate, 3 times as long as calyx, obscurely bilabiate, with 4-lobed limb, ciliate at margin, the lowermost lobe longest, the uppermost slightly emarginate, the tube with a ring of hairs inside; stamens 4, as long as corolla or somewhat exserted; nutlets smooth or tuberculate-roughened. Annuals, strongly aromatic, with punctate-glandular leaves; flowers in dense whorls subtended by bracts, these orbicular or rounded-ovate, green, abruptly acuminate, ciliate, shorter or longer than the flowers; inflorescence tomentose, cylindrical, spikelike, compact, mostly secund. About twenty species.

- 635 1. The whole plant grayish with rather dense pubescence; whorls dense, imbricated; nutlets tuberculate-verrucose, puberulent; bracts shorter than flowers . . . . . 3. **E. densa** Benth.  
+ . . . . .  
+ Plants sparsely pubescent, more or less green or reddish (anthocyanin-tinged); nutlets flat; bracts as long as or longer than flowers . . . . . 2.  
2. Bracts scarious, broad, long-aristate, the point half the length of the blade or sometimes nearly as long . . . . . 2. **E. serotina** Kom.  
+ Bracts herbaceous, reticulate-veined, broadly rounded, the point one-fifth to one-quarter the length of the blade; leaves elliptical or ovate-elliptical, crenate-serrate . . . . . 1. **E. patrinii** (Lep.) Garcke.  
+ . . . . .

\* Treatment by E.V. Volkova.

\*\* Named for Elsholz (1623–1688), court physician in Berlin.

1. *E. patrinii* (Lep.) Garcke, III. Fl. Deutschl. (1865) 307. — *E. cristata* Willd. in Roem. et Usteri Mag. IV, XI (1790) 5; Sp. pl. III, 59; Ldb. Fl. Ross. III, 335; Turcz. Fl. baic.-dah. II, 393; Shmal'g. Fl. Yugo-zap. Ross. 457; Kom. Fl. Man'chzh. III, 389; Syreishch. Fl. Mosk. gub. III, 69; Kryl. Fl. Zap. Sib. IX, 2399; Maevskii, Fl. 628. — *Mentha patrinii* Lep. in Nova Acta Petropol. 1 (1783) 336, tab. VIII. — *Hyssopus ocynifolius* Lam. in Encycl. méth. III (1789) 187. — *H. bracteatus* Gmel. ex Steud. Nom. Bot. (1841) 795. — **lc.**: Syreishch. op. cit.; Fedch. and Fler. Fl. Evrop. Ross. 838; Kom. and Alis. Opred. rast. Dal'nevost. kr. II, 893, Plate 270. — Exs.: GRF No. 832; Fl. Pol. exs. No. 479.

Annual; stem 10–17 cm long, erect, branched, with scattered hairs, more densely hairy under the node and in upper part under the inflorescence; leaves 1.5–10 cm long, 1–3.5 (4) cm broad, ovate-elliptical or [sic] crenate-serrate, narrowed at base to a long slender pubescent petiole; inflorescence dense, spiciform, cylindrical, mostly one-sided, 2–6 cm long and 1 cm broad, the rachis pubescent; bracts nerved, herbaceous, green, orbicular or broad-ovate, 4–5 mm long, 5–6 mm broad, terminating in a point ca. 1 mm long, the margin ciliate; calyx 1.5–2 mm long, ovate, subequally toothed, glandular, densely pubescent, ciliate as are the bracts; corolla lilac, 3–4 mm long, short-pubescent outside, the lobes ciliate; nutlets dark brown, ovoid, obtusish at upper end, mostly smooth, 1–1.5 mm long. July–August.

In ornamental and truck gardens; as weed in fields. — European part (adventive): U. Dnp., M. Dnp., U. V., V.-Kama, Dv.-Pech.; W. Siberia: Irt., Alt., Yenys.; E. Siberia: Ang.-Say., Dau.; Far East: Ze.-Bu., Uss., Uda, Sakh., Kamch. **Gen. distr.**: Mong., China, Japan. Introduced in Centr. Eur. and N. America. Described from Lake Balkal. Type in Berlin.

An aromatic plant, containing essential oil.

Note. Two forms occur in the Far East, in the Pos'et and Khanka regions: 1) f. *saxatilis* Kom. (rupestral), 2–10 cm high; leaves dark green, stiff, mostly conduplicate; 636 bracts broad, congested, aristate, intensely violet; 2) f. *ruderalis* Kom. (ruderal), 15–20 cm high; stems branched from base; leaves light green, thin, finely toothed; bracts loosely disposed; inflorescence rather loose.

2. *E. serotina* Kom. in Izv. Gl. bot. sada (1932) 210; Kom. and Alis. Opred. rast. Dal'nevost. kr. II, 909. — **lc.**: Kom. op. cit. 211, Fig. 2.

Annual; stem 10–15 (20) cm long, slender, erect, simple or branched, reddish, with scattered appressed hairs; leaves petiolate, cuneate at base, lanceolate or ovate-lanceolate, acuminate, dentate, scabrous, 1–3.5 cm long, 0.5–1 cm broad; bracts 6–7 mm long, 7–8 mm broad, rounded-deltoid at apex, with a subulate point to 1.5–2 mm long, densely ciliate, the veins covered with short hairs; inflorescence short-cylindrical, sometimes subovoid, 2–5 cm long, 0.5–1 cm broad; calyx 3 mm long, 1 mm broad, pubescent, the teeth long-aristate; corolla 4 mm long, 1 mm broad, reddish-violet, with scattered hairs, more densely hairy along the margins; anthers reniform. September.

Pebble beds; steep, sunny, rocky slopes. — Far East: Uss. Endemic. Described from Pos'et region. Type in Leningrad.

3. **E. densa** Benth. Lab. gen. et sp. (1832–1836) 714; Fedch. Rast. Turk. 684. — *Paulseniella pamirensis* Briq. in Bot. Tidskr. 28 (1908) 246. — **Ic.:** Jacquem. Voy. Ind. tab. 131.

Annual; stem 6–40 (50) cm long, simple or branched, covered with short crisp hairs; leaves 1–5 cm long, 1 cm broad, oblong-lanceolate, crenate-dentate, hairy on both sides; bracts shorter than flowers, broad-ovate, 2–3 mm long, 3–4 mm broad, with a point 0.5 mm long; inflorescence cylindrical, spikelike, 3–6 cm long, 0.5–1 cm broad; whorls dense, imbricated; spikes tomentose-villous; calyx 2 mm long, 1.5 mm broad, campanulate (inflated in fruit), 5-toothed, membranous, whitish, with dark green teeth, densely hairy especially at margin; corolla 3 mm long, 1.5–2 mm broad, pinkish, pubescent on both sides and with multicellular hairs 4–5 mm long; nutlets 1 mm long, ovoid-globose, tuberculate-verrucose, blackish, finely pubescent. July–August.

Stony southern slopes, meadows and pastures, also as a weed. — Centr. Asia: Pam.-Al. **Gen. distr.:** Ind.-Him., Mong. Described from India. Type in London.

### 637 Genus 1306.\* **Dysophylla**\*\* Blume

Blume, Bijdr. Fl. Neederl. Ind. (1825) 826

Calyx campanulate, closed in fruit, with 5 triangular dark violet teeth; corolla 4-lobed, tubular, persistent in fruit; stamens paired, the filaments bearded in middle part; anthers reniform, dehiscent transversally by a common slit; style longer than stamens; stigma with divergent lobes; nutlets glabrous. Perennial aquatic or paludose plants, rooting at the lower nodes; leaves verticillate.

The genus contains about 25 species.

1. **D. jatabeana** Makino in Tokyo Bot. Mag. XII (1898) 55. — *D. verticillata* Benth. in Wall. Pl. As. rar. I (1830) 30; Kom. and Alis. Opred. rast. Dal'nevost. kr. II, 910. — **Ic.:** Ter. Ic. Fl. Jap. 1131.

Perennial; rhizome long, slender, creeping, rarely thickened, nodose throughout with fleshy whitish roots arising from the nodes; stem 40–80 cm long, ascending, uniformly leafy, glabrous, simple, radicant at lower nodes; leaves linear-lanceolate, 1.5–8 cm long, 0.2–0.7 cm broad, in whorls of 3 or 4, rarely 5, sessile, acute, rounded at base, glabrous, the midvein prominent beneath, the margin with few obtusish teeth; flowers numerous, small; inflorescence spikelike, relatively loose, short at first, compact and somewhat elongated in fruit; bracts 2–2.5 mm long, linear, aristate, slightly narrowed toward base, densely covered with long erect spreading hairs and sessile glands; calyx 2.5–3 mm long, rounded-campanulate, 5-toothed, the teeth equal, triangular, aristate, dark violet, spreading in flower, converging in fruit; corolla pale lilac, 3.5–4 mm long, tubular, the tube 2–2.5 mm long, somewhat dilated in upper part, glabrous, 4-lobed, the lobes subequal, somewhat divergent, triangular, equal, obtuse, ciliate and glandular;

\* Treatment by E. V. Volkova.

\*\* From Greek *dys*, evil, and *phyllon*, leaf, i.e. leaf with undesirable properties, apparently alluding to the unpleasant smell of the foliage.



stamens exserted, paired, the filaments bearded in middle part with very short violet hairs; anthers reniform, transversely dehiscent; style longer than stamens; stigma longer than stamens, 2-lobed, the lobes divergent; nutlets 0.7 mm long, black, globose. Fl. July—August.

638 Swampy shores of oxbows and lakes, sedge-and-reedgrass bogs. — Far East: Uss.

**Gen. distr.:** China, Japan. Described from Japan. Type in Tokyo.

Subfamily VI. **OCIMOIDEAE** Benth. Lab. Gen. et sp. (1832–1836) I et in Benth. et Hook. f. Gen. II (1876) 1463; Briq. in Pflanzenfam. IV 3a (1895) 208 et 331. — Calyx 5–10-toothed, bilabiate or with 5 equal teeth; corolla bilabiate of 4/1 pattern; stamens 4, rarely only the lower 2 developed, parallel, declined; anther-locules divergent, soon coalescent at apex; ovary 4-parted to base; disk-lobes alternate with ovary-cells; nutlets with thin dry exocarp, with basal attachment and a small area of contact; embryo straight, with a short straight radicle. Herbs and woody plants.

Genus 1307.\* **Plectranthus**\*\* L'Hér.

L'Hér. Stirp. nov. I (1783) 84

Calyx campanulate, unevenly 5-toothed, bilabiate, the lower lip concave in fruit; corolla twice to thrice as long as calyx, gibbous above the base, bilabiate, the upper lip 3–4-lobed, the lower entire, scaphoid; stamens 4, of these one pair longer, somewhat reclinate, appressed to lower lip; anthers unilocular, ovoid-reniform; style filiform, equaling or somewhat exceeding the stamens, with 2-parted stigma; nutlets 1 mm long, ovoid-ovaloid, dark brown, glandular and tuberculate at apex. Perennials, woody at base; inflorescence paniculate, relatively narrow or spreading, many-flowered; flowers pale violet.

The genus is composed of more than one hundred species, distributed in the tropical and warm parts of Asia, Australia and Oceania. It does not occur in America.

1. Leaves oval, terminating in an acinaciform cusp, not constricted at base, sharply serrate, with fine acinaciform teeth; nutlets tuberculate at apex . . . . . 3. **P. serra** Maxim.
- + Leaves broadly cuneate at base, terminating in a long narrow cusp; nutlets glabrous at apex . . . . . 2.
2. Leaves ovate, often cordate at base, cuneately decurrent to petiole, the cusp not constricted at base or with constriction not reaching the midvein . . . . . 1. **P. glaucocalyx** Maxim.
- + Leaves obcordate, with cusp arising from apical notch, constricted at base to the midvein, the terminal segment coarsely and obtusely serrate, lanceolate or ovate-lanceolate, one-third the length of the whole leaf . . . . . 2. **P. excisus** Maxim.

\* Treatment by E. V. Volkova.

\*\* Spur-flower, from Greek plectron, cockspur, and anthos, flower.

1. **P. glaucocalyx** Maxim. Prim. Fl. Amur. (1859) 212; Bull. Acad. Sc. Pétersb. XX, 453; Kom. Fl. Man'chzh. III, 392; Kom. and Alis. Opred. rast. Dal'nevost. kr. II, 910.

Perennial; rhizome woody, nodose, very robust; stem 50–150 cm long, erect, in lower and middle part simple, woody, deeply sulcate, slightly glandular, pubescent, in lower part glabrous; leaves 10–12 (14) cm long, 6–8 cm broad, long-petioled, rounded-ovate, coarsely and sharply serrate, terminating in an acinaciform cusp, minutely punctate-glandular on both sides; flowers numerous, small, forming a spreading panicle glaucouscent inflorescence; bracts leaflike, often violet, oval or lanceolate, pubescent; flowers 5–7 on a common peduncle, appressed-pubescent; calyx 1.5–2 mm long, narrowly campanulate, unevenly 5-toothed, violet, with dense appressed hairs, cinerous (in flower), broadly campanulate in fruit, patent-haired or glabrous, conspicuously nerved and glandular, two teeth longer and broader than others; corolla 5–6 mm long, spurred, light violet, with dark spots on upper lip, slightly pubescent outside, with scattered glands, twice as long as calyx; upper lip with 4 short rounded lobes, the lower scaphoid, oval; stamens exerted, smooth, with rounded-reniform anthers, one pair shorter; nutlets 1 mm long, obovoid, light brown, glandular at apex. Fl. July–August.

Dry exposed mountain slopes, escarpments, oak woods and thickets, in groups. Far East: Zo.-Bu., Uss. **Gen. distr.:** China, Japan. Described from lower Amur. Type in Leningrad.

2. **P. excisus** Maxim. Prim. Fl. Amur. (1859) 213; Bull. Acad. Sc. Pétersb. XX, 451; Kom. Fl. Man'chzh. III, 392; Kom. and Alis. Opred. rast. Dal'nevost. kr. II, 910.

Perennial; rhizome gnarled, woody; stems numerous, 80–100 cm long, woody, deeply sulcate, branched, with minute hairs on the angles in upper part, glabrous below; leaves 10–14 cm long, 8–10 cm broad, long-petioled, rounded-ovate, slightly pubescent on the veins on both sides, densely punctate-glandular, the terminal segment 640 large, lanceolate or ovate-lanceolate in outline, one-third the length of the whole leaf; racemes terminal, borne in leaf axils from middle part of stem, many-flowered; peduncles bearing 1–5 flowers, glabrous; bracts subulate, aristate, very small; calyx 3.5–4 mm long, unevenly 5-toothed, nearly bilabiate, slightly gibbous, short-pubescent, stellately expanded in fruit, subglabrous, the teeth lanceolate, point-tipped, as long as the tube; corolla 7–8 mm long, pale bluish-violet, with tube inflated at base, gibbous, the upper lip 3-lobed, the lower scaphoid; stamens appressed to lower lip, with rounded dark anthers, one pair shorter; style 2-lobed, equaling or slightly exceeding the stamens; stigma obtuse, scarcely bilobate; nutlets ca. 2 mm long, obovoid, glandular at apex. Fl. July–August.

Coniferous and mixed forests, river banks and thickets. — Far East: Ze.-Bu., Uss. **Gen. distr.:** China, Japan. Described from lower Amur. Type in Leningrad.

3. **P. serra** Maxim. in Bull. Acad. Sc. Pétersb. XX (1875) 454; Kom. Fl. Man'chzh. III, 392; Kom. and Alis. Opred. rast. Dal'nevost. kr. II, 910.

Perennial; rhizome woody, thickened at the end; stem solitary, 60–90 cm long, erect, branched in upper part, deeply sulcate, woody at base, glabrous, only in upper part and in inflorescence with fine appressed hairs; leaves 2–7 cm long, 3–5 cm broad, petiolate, hairy on the veins on both sides, obovate, short-pointed, coriaceous,

the margin sharply serrate with large acinaciform teeth; inflorescence a branched many-flowered panicle, canescent with appressed hairs; calyx 2.5–3 mm long, densely canescent, glabrous in fruit, unevenly 5-toothed, the teeth ovate, dark violet; corolla 5–6 mm long, with scattered hairs on tube and upper lip, the tube twice as long as calyx, the upper lip 4-lobed, the lower longer, ovate-scapoid; stamens appressed to lower lip, one pair exserted, the filaments and anthers whitish; style filiform, longer than stamens; stigma 2-lobed, acute; nutlets ca. 2 mm long, tuberculate and glandular. Fl. July–August.

Floodplain meadows, sandy soils, deciduous forests and mountain slopes, growing in small groups, rarely solitary. — Far East: Uss. (collected on the Chinese bank of Sungari River). **Gen. distr.:** China. Described from Manchuria, Sungari River. Type in Leningrad.

# 641 Genus 1308.\* **Ocimum\*\*** L.

L. Sp. pl. (1753) 597

Whorls 6–10-flowered, aggregated into an interrupted spike or raceme; calyx ovoid or campanulate, accrescent and declined in fruit, 5-toothed, in our species hairy in throat, the uppermost tooth broader than the others, membranous, broadly ovate, decurrent on the tube and with margins overlapping onto adjoining teeth; corolla with a tube, bilabiate, the lower lobe longer than others, declined, the upper lip 4-lobed; stamens 4, the upper often with hairy appendage; nutlets smooth. Annuals, containing essential oil.

1. **O. basilicum** L. Sp. pl. (1753) 597; Boiss. Fl. or. III, 539; Benth. et Hook. f. Gen. pl. II, 1171; Benth. Lab. Gen. et sp., 5; Shmal'g. Fl. II, 305; Grossg. Fl. Kavk. 349; Taliev, Opred. rast. Evrop. ch. 503. — **Ic.:** Somoku-Dzusetsu, Ic. pl. Nippon, tab. 26; Varlikh, Russk. lekarstv. rast. Fig. 87.

Annual; stem 20–60 cm long, 4-angled, glabrous at base, somewhat pubescent above, green, reddish-tinged; leaves petiolate, ovate or oblong, cuneate at base, slightly dentate, sparsely pubescent, often glabrous; calyx persistent, short-haired outside, 5 mm long, 7 mm broad, in fruit 12 mm broad, 5-toothed, inflated-campanulate, the uppermost tooth larger than others, rounded, concave, minutely point-tipped, the others (especially the lower two) with a longer point, all often ciliate, with longer setiform hairs inside at base; corolla deciduous, whitish-pink, 6–8 mm long, greatly exceeding the calyx, the lower lip declined, entire, almost flat, the upper lip with 4 fimbriate lobes; stamens 4, one pair exserted and declined; anthers ovoid-reniform, with coalescent locules; nutlets dark brown, punctate, 2 mm long. July–August.

Cultivated in the Ukraine and in Centr. Asia, sometimes naturalized. — European part: M. Dnp., L. V.; Caucasus: E. Transc.; Centr. Asia: Kyz. K., Mtn. Turkm., Syr D., Pam.-Al., T. Sh.; Far East: Uss. **Gen. distr.:** Iran, Mong., China (Manchuria), Dzu.-Kash., Ind.-Him. Described from India. Type in London.

\* Treatment by E. V. Volkova.

\*\* From Greek *ozein*, to smell.



**Economic importance.** Used as condiment. It contains a small amount of camphor.

**Note.** A less frequently cultivated species is *O. canum* Sims (in the Ukraine and in N. Caucasus). *O. sanctum* L. is grown on a small scale in the vicinity of Tashkent.

## CORRIGENDA TO VOLUME XX\*

Page 23.

in the first paragraph add to the synonyms:

—? *A. yezoensis* auct. non Maxim.: Sngawara, III, Fl. Sagh. IV (1940) 1611;  
Popov in Bot. Zhurn. XXXVI, 4 (1951) 387.

Page 318.

the third paragraph from the top should read:

Subgenus 3. **FEDTSCHENKIELLA** (Kudr.) Schischk. — Gen. Fedtschenkiella  
Kudr. in Bot. Mat. Gerb. Bot. Inst. Uz. FAN SSSR IV (1941) 3. — Calyx bilabiate;  
stamens long-exserted.

in the fifth paragraph from the top add to the synonyms:

— *Fedtschenkiella staminea* (Kar. et Kir.) Kudr. l. c. 4.

Page 337

the conclusion of the last paragraph should read:

Described from plants collected by A. D. Pyataeva in Centr. Karatau. Type in  
Tashkent.

Page 338

first paragraph should read:

Genus 1264. **PSEUDOMARRUBIUM\*** M. POP.

M. Pop. in Bot. Mat. Gerb. Bot. Inst. AN SSSR VIII, 5 (1940) 75. — *Neustruevia*  
Juz. in Fl. SSSR XX (1954) 501, 526.

second footnote should read:

\* From Greek *pseudos*, false, pretending to the generic name in question, on account of the  
general plant habit.

third paragraph from the top should read:

1. *P. eremostachydioides* M. Pop. in Bot. Mat. gerb. Bot. Inst. AN SSSR VIII, 5  
(1940) 75. — *Neustruevia karatavica* Juz. in Fl. SSSR IX (1954) 502, 527.—  
*Eremostachys karataviensis* M. Pop. et Tekut. in sched. non Knorr.

\* Crossreferences are to English page numbers.

## EREMOSTACHYS Bge.

### 1. *E. dzhambulensis* Knorr. sp. n.

Planta 30—40 cm alta, collo radicali lanato, caules erecti vel subcurvati, simplices in dimidio superiore interdum ramosi, basi plus minusve dense pilosi (rarius glabri) superne sparse pubescentes sub inflorescentia pilis articulatis et planis dense vestiti; folia radicalia 13—14 cm longa, 6.5—7.5 cm lata pinnato-dissecta, segmentis sessilibus, lobis oblongis vel lanceolatis, rotundatis vel obtusatis, petiolis 4.5—7.5 cm longis; folia floralia inferiora 9 cm longa, 2.5—3.5 cm lata, apicalia oblongo-elliptica, obtuse grandidentata vel pinnato-dissecta, supra subglabra, subtus nervis prominentibus ornata, pilis stellatis inaequaliter radiatis et glandulosis vestita, sessilia. Flores sessiles octoni in verticillos quorum unus remotus, reliquos approximatos et inflorescentiam spiciformem oblongo-ellipticam congesti; bracteae lanceolatae vel lineari-lanceolatae, apice aculeiformi acuminatae, 15—18 mm longae  $\frac{3}{4}$  vel  $\frac{1}{2}$  calycis aequilongae, pilis longis tenuibus multiarticulatis squarrosis et planis articulatis vestitae; calyx tubulosus 24—26 mm longus dentibus late triangularibus apice rigide aculeatis, pilis multiarticulatis ramosis et glandulosis tectus; corolla flavescente-albida, 30—35 mm longa, labio superiore extus sparse pubescente, quam inferius brevior, margine intus piloso-barbato, labio inferiore extus glabro, lobo medio obcordato, lobis lateralibus late ovatis brevioribus, tubo intus haud piloso-annulato filamenta appendicibus longitudinalibus, longis, fimbriatis. Nuculae apice dense breviter pilosae.

Habitat in steppis gramineis Kasachstaniae.

Typus: e districtu Dzambul prope pagum Vyssokoje. Legit V. L. Lipsky 1903 VI 5, n° 4459; in herb. Leninopolitano conservatur.

Affinitas. Speciei *Eremostachys speciosa* Rupr. affinis, a qua tamen foliis pilis stellatis inaequaliter radiatis glandulosisque tectis (sed haud foliis subtus pilis multiarticulatis, flexuosis et parvis stellatis vestitis), bracteis calyce in quartam partem vel duplo brevioribus (haud bracteis calyci aequilongis), corolla 30—35 mm longa, labio superiore quam labium inferius brevior (haud corolla 40—50 cm longa, labiis aequilongis) bene differt.



2. *Ph. hypoleuca* Vved. sp. n.

Caules pauci, erecti, stricte ramosi, tenuiter albo stellato tomentosi, 40—60 cm alti. Folia lanceolata vel lineari-lanceolata, acuta, basi attenuato cuneata, laxae saepe argute serrata, supra rugosa, viridia, laxae tenuiter stellato-pubescentia, pilis simplicibus solitariis brevibus intermixtis, subtus nervis prominentibus tenuiter albo tomentosa, petiolata, summa subsessilia. Flores breviter pedicellati, in verticillastris multifloris distantibus in axillis foliorum superiorum dispositi. Bractaeae tenuiter subulati, tenuiter stellato pubescentes, demum glabratae, ad  $1\frac{1}{2}$  tubum calycis superantes, saepe basi trini coalitae. Calyx (sine dentibus) 12—14 mm longus, tenuiter albo stellato tomentosus, costatus, dentibus tenuiter subulatis horizontaliter patentibus, 8—14 mm longis. Corolla roseo-lilacina, extus stellato tomentosa, 25—28 mm longa, tubo exserto, labio inferiore intus glabro.

Habitat in argillosis in regione inferiore montium circa vallem Ferganicam.

Affinis *Ph. Regelii* M. Pop., sed indumento tenuissime stellato bene differt.

Typus: Fergana orientalis, inter opp. Osch et Assake, Scharichansai, 1931 VI 27, n° 145, leg. Blak et Semenichina; in Herb. Un. Asiae Mediae in Taschkent sub n° 132254 conservatur.

3. *Ph. Drobovii* M. Pop.

Caules 1—2 adscendentes, simplices dense stellato pubescentes, demum glabrati, 20—25 cm alti. Folia lanceolata, acuta, basi cuneato angustata, obscure undulato serrata subintegra, supra rugosa, canescenti-viridia, densissime stellato-pubescentia, subtus nervis prominentibus, subincano tenuiter stellato-tomentosa, radicalia sat longe petiolata, superiora subsessilia, horizontaliter patentia vel pendula. Flores brevissime pedicellati in verticillastris paucifloris distantibus in axillis foliorum superiorum dispositi. Bractaeae subulatae, paullo incurvae, tubum calycis circiter aequantes, pube tenui stellata pilisque longis simplicibus patentissimis tuberculo sitis tectae. Calyx (sine dentibus) 12—14 mm longus pube stellata pilisque longis simplicibus villosito-tomentosus costatus, dentibus tenuiter subulatis horizontaliter patentibus, 3—5 mm longis. Corolla, videtur, roseo lilacina, extus stellato-tomentosa, 23—25 mm longa tubo subexserto, labio inferiore intus piloso.

Habitat in saxosis regionis mediae jugi Alaici (Pamiralaj).

Affinis *Ph. fruticetorum* Gontsch. et *Ph. betonicifoliae* Rgl., sed ab ambabus bracteis praeter pubem stellatam pilis simplicibus longis instructis differt.

Typus: in jugo Alaico, Anchor, Arpa, in schistosis, 1916 V 22, fl., n° 1030, leg. Drobov; in Herb. Un. Asiae Mediae in Taschkent sub n° 17397 conservatur.

Ad honorem collectoris nominata est.

#### 4. *Ph. pseudopungens* Knorr.

Planta 30—75 cm alta. Caules crassi, in parte superiore divaricato-ramosi, inferne pilis crassis articulatis simplicibus et stellatis modo tecti; folia radicalia ovata et ovato-oblonga 7 cm longa et 3.5 cm lata, basi suborbicularia, caulina radicalibus similia, sed angustiora, floralia oblonga, omnia crenata, apicalia minora, integerrima vel vix crenata, supra rugosa, glabra vel pilis parvis stellatis radio elongato et simplicibus sparsis, subtus pilis stellatis radio elongato densis vestita. Inflorescentia e verticillis numerosis inferne distantibus superne approximatis 8—12-floris; bracteae calyce aequales vel longiores 11—12 mm longae, pilis 2—4-articulatis et in tuberculis assidentibus stellatis tectae; calyx campanulatus 8—9 mm longus, nervis elevatis, pilis stellatis et stellatis radio crassissimo elongato plerumque in nervis tecta; calycis dentes inaequilongi, subreclinati; corolla roseo-lilacina, tubulo in parte inferiore pilis stellatis radio valde elongato et stellatis radiis inaequilongis extus tecto; labium superius integerrimum, labium inferius lobo medio obovato et lateralibus late-lanceolatis; filamenta pubescentia, appendicibus lineari-lanceolatis, deorsum reclinatis; nuculae glabrae. VI—VII.

**Habitat** In steppis montanis et inter frutices. Caucasus. Transcaucasia meridionalis et orientalis. Ex Armenia descripta. Typus in Leningrad.

A specie propinqua *Ph. pungente* Willd. foliis inferioribus ovatis vel ovato-oblongis, pilis stellatis radio elongato subtus tectis, floralibus inferioribus distanter crenatis; bracteis pilis bi-quadrarticulatis et stellatis tuberculo assidentibus vestitis; calyce pilis stellatis et stellatis radio crassissimo elongato tecto; corolla labio inferiore lobo medio obovato, lateralibus interdum lanceolatis differt.

#### 5. *Ph. tschimganica* Vved. sp. n.

Caules bini pro portione plantae tenues, subflexuosi, obscure quadrangulati, simplices, pilis simplicibus retrorsis parvis et paullo majoribus complanatis, superne praeterea pilis stellatis radio centrali elongato flexuoso complanato tecti, 45—50 cm alti. Folia radicalia numerosa a late obovatis basi cordatis ad lanceolata basi truncata ludentia, acuta, grosse crenato-dentata, supra subrugosa pilis simplicibus multicellularibus laxè obsita, subtus pallidiora, nervis prominentibus, pilis stellatis eisque majoribus radio centrali valde elongato haud dense tecta, petiolis lamina  $1\frac{1}{2}$ —3-plo longioribus, pilis stellatis, eis simplicibus retrorsis tectis suffulta; caulina uniparia oblongo-lanceolata basi truncata brevibus petiolata, caeterum similia; floralia valde diminuta lanceolata, acuminata, acutissima, integra, sessilia, flores 2—3-plo superantia. Flores sessiles in verticillastris 2-plurifloris distantibus dispositi; bracteae subulato-lineares, calycem subaequantes, pilis stellatis radio centrali valde elongato flexuoso dense tectae; calyx (sine dentibus) 12 mm longus, densissime minute stellato pubescens, pilis stellatis

radio centrali valde elongato sublanatus, dentibus semiorbiculari-triangularibus, spinula patente subulata ut bractee pubescente, 4—5 mm longo mucronatis; corolla videtur lilacina, ca. 20 mm longa tubo 10 mm longo, extus in dimidio inferiore glabro, intus basi obliquo annulato piloso, limbo extus radiis centralibus pilorum stellatorum longe piloso, labio superiore intus barbato, margine fimbriato, inferiore superiori aequilongo, trilobato lobo medio suborbiculari dentato; stamina exappendiculata, filamentis subvillosis; styli lobi aequilongi; ovarium apice glabrum.

Habitat ad declivia montis Tschimgan Majoris (Tianschan occidentalis).

A *Ph. oreophila* K. et K. floribus paullo minoribus dentibus calycinis longioribus et styli lobis aequilongis imprimis differt. Proxima videtur *Ph. Vavilovii* M. Pop., sed foliorum forma corollae labiis aequilongis aliisque notis dignoscitur.

Typus. Tjanschan, Tschimgan, in rupibus 1926 VII 6, fl., leg. Popov sub *Ph. oreophila* var. *stenophylla* M. Pop. (in Herb. Un. As. Med. in Taschkent sub n° 101870 conservatur).

#### 6. *Ph. tythhaster* Vved. sp. n.

Caules 2—3, firmi, erecti, simplices, pube fasciculato-stellata canescentes, 40—50 cm alti. Folia radicalia ovata, interdum magna, acutiuscula, basi cordata, crenata, supra subrugosa viridia, pube stellata tenuissima et ea majore fasciculato-stellata radio centrali robustiore longioreque dense tecta, subtus nervis prominentibus pube stellata et fasciculato stellata canescentia, petiolata laminam aequantibus canescentibus suffulta; caulina 1—2-paria brevius petiolis caeterum similia; floralia sensim decrescentia, inferiora brevissime petiolata superiora sessilia. Flores breviter pedicellati in verticillastris 1—3 paucifloris distantibus dispositi; bractee lineari-subulatae, calycem paullo — sesqui superantes tenuiter stellato pubescentes pube nonnula radio centrali elongato. Calyx 12—13 mm longus, pube tenui stellata et ea majore fasciculato-stellata canescens, dentibus brevissimis subquadratis abrupte spinula brevi 1—2 mm longa mucronatis; corolla videtur rosea, 21—22 mm longa, extus stellato-pilosa, tubo inferne glabro, intus basi oblique piloso annulato, labio superiore intus dense longe barbata; staminum appendices calcariformes; styli lobi valde inaequilongi.

Habitat in saxosis regionis mediae jugi Alaici (Pamiralaj).

Valde affinis *Ph. canescenti* Rgl., sed foliis scabridis (nec velutinis) pube tenuissima incontacta differt.

Typus: in declivio septentrionali jugi Alaici, Schachimardan, Gandakusch, 1915 VII 27, fl., n° 295, leg. Drobov (in Herb. Un. As. Med. in Taschkent sub n° 17396 conservatur).

#### 7. *Ph. Knorringiana* M. Pop. sp. n.

Rhizoma lignescens breve obliquum apice ramosum caules floriferos et lateraliter ad ejus basin gemmas 2—3 pro anno sequente (annis



sequentibus) reliquiis petiolorum anni praecedentis obtectas edens. Caulis erectus, quadrangularis, satis elatus, ad 100 cm usque altus, internodiis paucis sed longis, in parte superiore brachiatim patenti pauciramosus, ramis elongatis ut et ipsa caulis summitas verticillastos gerentibus, in internodio infimo (breviore) hirsuto-villosus, in superioribus breviter stellato-pubescent, lateribus fere planus. Foliorum radicalium laminae oblongae, nec ovatae ut in caeteris speciebus „*Phlomidopsidis*“, basi vix cordatae, potius truncatae vel subcuneatae, majusculae, 10—20 cm longae, 4—6 sm latae, membranaceae, molles (nec rigidae coriaceae), margine aequaliter crebre crenato-dentatae, dentibus utrinque 20—30, obtusae, canae, subtus pube stellata densa albo-canae, nervis reticulato-elevatis, supra multo glabriores subcanescentes; petioli laminis paulo braviores, tenues, parce hirsuti. Folia caulina breviora et angustiora, brevius petiolata, pauca. Folia floralia lanceolata subacuta verticillastos superantia. Verticillastri densi multiflori, parvi, 2 cm in diam., valde remoti, suborbiculares. Bracteae rigide crasse subulatae, pube stellata canescentes, apice glabro, subpungentes, calyces paulo superantes. Calyces campanulati, 8—9 mm longi, pube stellata radiis nonnullis elongatis subhirsutocani, dentibus brevissimis latis truncatis e media spinulis rigidis divaricatis 3 mm longis armatis. Corolla brevis, ca. 12 mm longa; galea obtusa densissime albo-pilosa (extus intusque), labio quam galea paulo brevior vel eam aequante trilobo, lobis lateralibus ovatis obtusis brevibus, medio lobo longiore obcordato-cuneato, extus (subtus) villosulis. Stylus ramis valde inaequalibus. Stamina antica posticis longiora, nuda, basi exappendiculata; stamina postica medio villosa (ad insertionem ad corollae tubum), inferius tubi adnata et ima basi, fere ad anulum pilorum in basi tubi intus positum, appendicibus planis membranaceis subquadratis obtusis erectis aucta. Nuculae .....

In Asiae Mediae valle Ferghana, in montibus eam meridiem et orientem cingentibus, in districtis Osch et Andishan.

Typus: in collibus ad pagum (urbem olim) Usgent, fl. 26 V 1916 N. V. Androssov in Herb. Petorop. — Collecta etiam prope Taran-bazar (Litvinov, Knorring et Minkwitz) et fontes Chazret-Ajub (Knorring et Minkwitz).

Species insignis a caeteris „*Phlomidopsidibus*“ florae Asiae Mediae foliis angustis oblongis vel lanceolatis, nec ovatis et basi cordatis, floribusque parvis distinctissima. Omnes species „*Phlomidopsidis*“, tam diversae in Asia Media, ex hybridizatione inter „*Phlomidopside*m“ primaevam et *Euphlomidem* ortae sunt, ut prius („*Phlomis* Vavilovii et allied species“ — Bull. Univ. Taschkent. 1925) explicavi; characteres *Euphlomidis* in nostra specie sunt: folia angusta, pubescentia stellata et bracteae subulatae pungentes.

In honorem cl. O. E. Knorring plurimus annis explorationi florae Tianschanicae, praesertim Ferghanicae, traditae speciem nominavi.

## LEONURUS L.

### 8. *L. panzerioides* M. Pop. sp. n.

Caules pauci erecti, simplices vel superne stricte ramosi, pubescentes sub inflorescentia sublanati, 20—60 cm alti; folia ambitu orbicularia, in partes rhomboideo-obovatas obtusas vel acutiusculas inaequaliter pinnatolobatas palmatim partita, pubescentia, longe petiolata, floralia diminuta minus partita. Flores sessiles, in verticillastris paucifloris approximatis ad apicem caulium ramorumque dispositi; bracteae subulato-filiformes, lanatae, calyce paullo breviores; calyx 6—7 mm longus, lanatus, dentibus late triangularibus abruptiuscule subspinosus porrectis tubo 3-plo brevioribus; corolla lilacina, 10—11 mm longa, extus pilosa, tubo ca. 5 mm longo, intus annulato; labio superiore suberecto, inferiore ei aequilongo trilobato medio obovato; nuculae pallide brunneae, acute triangulares, apice oblique truncatae et pubescentes, ca. 3 mm longae.

Habitat in saxosis regionis superioris montium Tianschanicorum.

Typus: Talassky Alatau, in tractu Maidantal in alpinis schistosis. 1921 IX 5, fl., leg. R. Abolin et M. Popov n° 8871 (in Herb. Un. As. Med. in Taschkent sub n° 102253 conservatur).

9. Subgenus **Cardiochilium** V. Krecz. et Kuprian. — Sectio *Panzeria* Pers. Syn. pl. II (1807) 126 p.p. — Calyx non manifeste bilabiatus dentibus inferioribus longioribus; corollae tubus supra anulum non dilatatus. Labium inferius rectum lobo medio trilobulato, cuius lobulus medius obcordatus. Labium superius elongato ovatum galeiforme. Folia trisecta vel tripartita.

Species nostrae sequentes: *L. macranthus* Maxim., *L. heterophyllus* Sweet, *L. sibiricus* L.

## LAGOCHILUS Bge.

10. *L. setulosus* Vved. sp. n. — *L. hirtus* Lapin, Onp. раст. Ташк. оаз. I (1938) 253, non F. et M.

Caules ima basi lignescentes, tenues, erecti simplices vel ramosi, glabri vel sparsissime patenter setulosi, demum albescentes, 30—80 cm alti; folia ambitu rhomboideo late ovata, in partes lobatas lobis abrupte acutatis mucrone cartilagineo destitutis secta partitave, glabra, longe petiolata, media et superiora brevius petiolata petiolis anguste alatis. Flores in axillis foliorum superiorum quaterni-seni sessiles; bracteae tenues aciculares spinosae horizontaliter patentes, glabrae vel setulis solitariis instructae; calyx (inferiores 15—25 mm longi) anguste campanulatus, interdum paullo curvatus, glaber vel saepius tubo setuloso, dentibus subpatentibus (limbo obscuro) anguste triangularibus spinosis tubo  $2\frac{1}{2}$ -plo brevioribus; corolla alba brunneo maculata 23—30 mm longa, labio superiore pilis rectis tecto; nuculae glabrae 4—5 mm longae.

**Habitat** in argillosis in promontoriis montium Tianschan occidentalis.

Foliis magis partitis aliisque notis a *L. hirta* F. et M. differt.

**Typus:** prope urbem Taschkent 1919 VI 20, fl., leg. Betger (in Herb. Un. As. Med. in Taschkent sub n° 102478 conservatur).

**11. *L. pubescens* Vved. sp. n.**

Caules ima basi lignescentes, erecti, simplices vel ramosi, breviter patente pilosi, demum saepe glabrati albescentes lucidi, 15—50 cm alti; folia ambitu rhomboidea late ovato orbicularia vel subspathulata, obtusa, basi cuneata, lobata vel partita, lobis cartilagineo mucronatis, dense patente pubescentes, longe petiolata, media et superiora brevius petiolata petiolis angustissime alatis. Flores in axillis foliorum superiorum quaternis sessiles; bracteae tenues aciculares, horizontaliter patentem, spinosae, patente pubescentes, apice glabrae; calyx anguste campanulatus (inferiores (14) 18—24 mm longi), saepe paullo curvatus, patente pubescens, rarissime in tubo parvisse setulosus, dentibus subpatentibus (limbo obscuro) anguste triangularibus spinula longa terminatis tubo duplo brevioribus; corolla alba vel roseo suffusa, nervis brunneis, 22—23 mm longa, tubo exserto, labio superiore pilis rectis tecto; nuchulae glabrae, 4 mm longae.

**Habitat** in gypsaceis in promontoriis jugorum Alaici et Turkestanici.

A *L. inebriante* Bge. indumento et imprimis calyce limbo obscuro differt.

**Typus:** in jugo Alaico, Tiutiaksaj, 1936 VI 21, fl., leg. Glybin (in Herb. Un. As. Med. in Taschkent sub n° 189580 conservatur).

## **BALLOTA L.**

**12. *B. grisea* Pojark. sp. n.**

Perennis, rhizomate repente; caulis 20—80 cm altus, erectus viridis vel purpureo-violaceus, saepius ramosus, ramis plerumque longis rarius brevibus, sub angulo acuto divergentibus, ut caulis pilis brevibus tenuibus mollibus eglandulosis deorsum inclinatis tectis; folia utrinque sed supra densius indumento denso griseo e pilis sursum appressis vestita, nervis supra impressis subtus prominentibus, oblongo-ovata acuminata usque ad late ovata, acuta vel obtusata, basi truncata vel leviter cordata, margine acute vel obtuse non raro inaequaliter grandidentata, caulina (2) 2.5—6 cm longa, (1.2) 1.5—4.5 cm lata, floralia ut ramularia distincte minora; petioli plus minusve deorsum curvati, dense et molliter pubescentes. Cymae breviter pedunculatae (pedunculis 2—4 mm longis), 5 (superiores) 7—15-florae, valde confertae, inferiores dissitae, superiores dense approximatae; calyx 7—11 mm longus, viridis vel nonnunquam violaceus, ad nervos pilis tenuibus sursum vergentibus dense vestitus, tubuloso-infundibuliformis, in parte superiore fere subito dilatata, dentibus divaricatis, sube-



rectis (non patentibus), tubo ca. 3—3.5 (2—4)-plo brevioribus, ovatis, rarius lanceolato-ovatis, apice in mucronem brevem (dente ca. 2—3-plo brevior) rigidum attenuatis; corolla violaceo-rosea, tubo calyci aequilongo, labio superiore oblongo-elliptico, extus longe piloso, apice satis profunde emarginato, labio inferiore superiori aequilongo, lobo medio latissimo apice late emarginato, lobis lateralibus ovatis vel oblongo-ovatis; nuculae ca. 2 mm longae et 1 mm latae, obovoideae, fusco-nigri, lucidae, scabriusculae.

Habitat in angustiis montium, in pratis silvaticis et subalpinis, nec non in ruderalibus.

Typus. Azerbaidzhan, distr. Kussary, supra pag. Anych, in pratis subalpinis, raro, 2—5 VIII 1925, fl. Gurinsky. Typus in Leningrad.

Area geographica. Transcaucasia orientalis (Daghestan, distr. Shemacha, steppe Mil, Talysh).

Affinitas. A *B. nigra* L. pubescentia densa longa grisea (nec sparsa, brevi), calycis dentibus brevioribus (tubo ca. 3—3.5-plo brevioribus, nec ei subaequilongis vel duplo brevioribus) et brevius mucronatis, corollae labio superiore distincte emarginato, labio inferiore latiore bene differt.

### 13. **METASTACHYS** Knorr. gen. nov.

Calyx tubulosus dentibus 5 subulatis, spinosis. Corolla lilacina labio superiore erecto bilobato, quam labium inferius brevior vel huic aequilongo, labio inferiore trilobato, lobo medio late-reniformi, in parte media convexo, solidiore, margine irregulariter denticulato, undulato, lobis lateralibus late oblongis vel ovato-oblongis, lobo medio brevioribus; corollae tubo in parte media ad faucem dilatatam annulo piloso, pilis intricatis subtomentosis infra corollae bifurcationem in labiis duobus, praedito, stylus 9 mm longus inter filamenta staminum superiorum, lobis stigmatis lineari-oblongis inaequilongis transiens. Stamina 4 didyma fauce non exserta, ad basin triangulari-dilatata. Antherae reniformes, filamenta pilis simplicibus longis fasciculatis et propius ad basin papillaribus dimensione varia dense tecta. Inflorescentia e verticillis approximatis spicam oblongam vel ellipticam formantibus. Planta perennis rhizomate obliquo radices longas fibrillosas foliis sagittatis basi profunde cordatis, orbiculatiter grandidentatis supra sparse setoso-pilosis, subtus griseis pilis stellatis radiis inaequalibus copiose vestitis.

Generi *Stachydi* affinis, a quo corollae structura bene differt; in parte corollae media intus annulus pilorum intricatorum densus, latus, ad faucem adiens; filamenta breviora, tubo corollae inclusa, basi triangulari-dilatata; labium superius bilobatum.

Species generis *Stachydis* annulo pilorum angusto, obliquo, basi tubi corollae collocato, interdum nullo, filamentis longis, e tubo exsertis, labio superiore integro vel breviter sinuato instructae.

Genus monotypicus. Typus generis — *M. sagittata* (Rgl.) Knorr.

## STACHYS L.

### 14. *S. pseudofloccosa* Knorr. sp. n.

Caules 60—70 cm alti, a basi recti vel subcurvati, superne ramosi pilis lanatis intricatis in inflorescentia reclinatis tecti; folia caulina inferiora et media ovata, orbiculari-crenata, 4—6 cm longa, 2—3 cm lata, petiolata, petiolis 1.5—2.5 cm longis, superiora floralia eis similia, minora, sessilia, apicalia ovato-lanceolata, 8—10 mm longa, 3—4 mm lata, subtus profunde foveolata, velutino-lanata, in partibus convexis pilosa, supra olivaceo-grisea sparse regulariter pilosa. Inflorescentia longa verticillastris interruptis 8—12-floris sursum approximatis; bracteae lanceolatae calyce triente vel duplo breviores pilis tenuibus longis tectae; calyx campanulatus longe pilosus dentibus lanceolatis 3—3.5 mm longis, basi 2—3 mm latis, spinoso-acuminatis acumine 1—1.5 mm longo, tubo duplo brevior; corolla pallide roseo-lilacina tubulo e calyce non exserto a basi usque ad medium glabro, superne ad faucem sparse piloso; labium superius inferiore subduplo brevius, pilosum, labium inferius lobo medio late obovato lateralibus late oblongis quam lobus medius duplo brevioribus; nuculae triangulares glabrae.

Habitat in regione arboreo-fruticosa ad declivitates schistosas meridionales. Asia Media, Pamiro-Alai.

Typus: in jugo Turkestanico, in systema fl. Sanzâr, Tereklişay, 1914 VI 14, leg. A. Michelson. Typus in Leningrad.

Affinitas. *Stachys hissaricae* Rgl. propinqua, sed foliis olivaceo-griseis, supra sparse pilosis, bracteis lanceolatis tubulo parte quarta vel duplo brevioribus, calyce longe piloso, corolla pallide roseo-lilacina differt.

## SALVIA L.

### 15. *S. Alexandri* Pobed. sp. n. (Sect. *Eusphace* Benth.). — *S. suffruticosa* Grossh. Fl. cauc. III (1922) 318, non Montbr. et Auch.

Suffruticosa. Caulis ramosus basi lignosus, cortice griseo rimuloso tectus; rami annotini virides simplices vel ramosi pilis parvis appressis et longis pluricellularibus sparsis tecti, axis inflorescentiae glandulis breviter stipitatis vestitus. Folia caulina imparipinnata bijuga lobis ellipticis 4—5.5 cm lg. 1.2—1.7 cm lt. (terminalibus majoribus) acutis cuneatis margine acute dentatis decurrentibus per petiolulos, utrinque pilis brevibus apice incurvatis obtectis; petioli 0.6—1.2 cm lg., alati, margine longo sparseque albo-ciliati; folia floralia inferiora late ovata vel rotundata mucronata subtus pubescentia, margine longe albo-ciliata, supra glabrescentia, calycis dimidio breviora, superiora glandulis breviter stipitatis vestita. Verticillastri 7, remoti, 2—4 cm lg. 6—10-flori, supremi abortivi. Flores flavi (?) 2.5—3 cm lg. breviter pedicellati, pedicellis 3—4 mm longis, breviter appresse pubescentibus, bracteolis duabus parvis viridibus

glandulosus praeditis. Calyx late campanulatus 8—10 cm lg. profunde bilabiatus, tubo albido nervis dentibusque viridibus, pilis longis pluricellularibus et inter nervos glandulis breviter stipitatis dense vestitus; labium superius ovatum tridentatum dentibus conniventibus; labium inferius bidentatum dentibus ovatis subulatis. Corolla calyce triplo longior tubo brevi intus tota superficie piloso et in parte inferiore annulato-piloso, extus glandulis breviter stipitatis vestito; galea labio inferiori aequilonga, suberecta fornicata; labii inferioris lobus medius transverse ellipticus lobis lateralibus latis magnis ellipticis reflexis; stamina sub labio superiore inserta, stylus conspicue exsertus; nuculae ignotae.

Typus. Transcaucasia, respublica autonoma Nachitschevan in monte Ilanlu-dagh, 5 VI 1934, L. Prilipko (in Herb. Leninopolitano conservatur).

In memoriam viri clarissimi Alexandri Grossheimii florum Caucasi investigatoris hanc speciem dedico.

Species nova affinis *S. suffruticosae* Montbr. et Auch. sed calycibus late campanulatis minoribus 8—10 mm tantum lg. (nec 15—17 mm longis) verticillastris distantibus 2—4 cm (nec approximatis) et caule brevius pubescente bene differt.

16. **S. Lipskyi** Pobed. sp. n. (Sect. *Physosphace* Bge.). — *S. Trautvetteri* Rgl. var. *karatavica* Lipsky in Acta Horti Petrop. XVIII (1900) 93, p. p.

Perennis. Radix lignosa, apice non crassa, griseo-fusca. Caules singuli vel bini, 20—30 cm longi, erecti, simplices, a basi pilis tenuibus longis pluricellularibus et glandulis longe stipitatis (in inflorescentia breviter stipitatis) dense tecti. Folia radicalia haud numerosa, pallide viridia, oblonga, (4) 5.5 (7) cm lg. (1.5) 2.5 (3) cm lt. pinnata, lobis oblongis pin-natim fissis, utrinque (subtus densius) glandulis stipitatis tectis; petioli laminae aequilongi pilis longis patentibus obsiti; folia caulina opposita vel terna, inferiora pinnata radicalibus minora, superiora lanceolata parva integerrima omnia sessilia, pilis glandulosus stipitatis dense tecta, folia floralia lanceolata pedicellis aequilonga vel breviora integerrima, apice attenuata et subulata pilis glandulosus dense vestita. Inflorescentia simplex vel basi vix ramulosa, racemiformis, verticillastris 2—3 confertis. Flores 2—3.5 cm lg. albi, pedicelli calyce duplo breviores, subnutantes basi bracteolis duabus linearibus viridibus pilis glandulosus margine longe ciliatis, foliis verticillastrorum parum vel duplo brevioribus. Calyx 15—22 mm lg. basi haud angustatus pilis glandulosus tectus, labia superiora et inferiora bidentata, dens medius nullus, dentes subaequilongi subulati, postea aucti. Corolla calyce duplo longior tubo in fauce dilatato intus annulo fimbriato, galea lata brevis labio inferiori subaequilonga apice profunde emarginata marginibus reflexis glabra, lobi labii inferioris subaequilongi semirotundati, medio lateralibus parum latiore. Stamina et styli vix exserti, thecaphora omnia fertilia, staminodia bene evoluta.



Receptaculum glabrum, lobi ejus vix notati. Nuculae 4 mm lg. subtriquetrae, fuscae pallide striatae.

Habitat: in declivibus montanis.

Typus: Kasachstania, Karatau Syr-Dariensis, Czimkent, pag. Kornilovka, 17 V 1909, V. Lipsky (in Inst. Bot. Ac. Sc. conservatur).

*A. S. Trautvetteri* Rgl. pubescentia calycis caulisque glandulosa copiosiora et labio superiore calycis bidentato (nec tridentato) differt.

17. **S. Komarovii** Pobed. sp. nov. (sect. *Physosphace* Bge.). — *S. Trautvetteri* Rgl. var. *zarawschanica* Lipsky в Труд. Бот. Сада XVIII (1900) 93.

Perennis. Radix lignosa, brunnea, apice haud crassa. Caules bini-terni, 25—50 cm alti in parte inferiore glandulis stipitatis tecti, in inflorescentia (praecipue in parte superiore) pilis longis tenuibus pluricellularibus vestiti. Folia radicalia haud numerosa ovata (3) 5 (7) cm lg., (3) 3.5 (4) cm lt. (in parte inferiore), pinnata laciniis ellipticis vel oblongis profunde dentatis vel interdum lobatis, acutis, viridia supra glabra vel glandulis vix stipitatis vestita, subtus pilis longis tenuibus pluricellularibus pubescentia; petiolis laminae aequalibus vel subbrevioribus, dense patenter pilosis. Folia caulina trina in nodis inferioribus radicalibus similia minora breve petiolata vel sessilia, superiora et folia floralia lanceolata vel elliptica simplicia integerrima sessilia acuta supra pilis longis tenuibus appressis, subtus margineque glandulis numerosis stipitatis, tecta. Inflorescentia ramosa verticillastris 2—3-floris remotis. Flores 3—4.5 cm lg. albi?, pedicelli breves pilosi tenues basi bracteolis ellipticis parvis viridibus, pilis longe stipitatis obsiti. Calyx 19—20 mm lg. basi haud angustatus pilis longis pluricellularibus glandulisque stipitatis vestitus, semper violaceus, postea paulo auctus, labium superius tridentatum dentibus lateralibus brevibus triangularibus, medio brevissimo, labium inferius bidentatum, dentibus triangularibus, breviter subulatis. Corolla calyce duplo vel 2.5-plo longior, tubus fauce gradatim dilatatus, intus annulo fimbriato, labium superius inferiore longius profunde emarginatum marginibus reflexis, glabrum, labium inferius lobis lateralibus late ovatis lobo medio lato obovato reflexo. Stamina stylusque exserti, thecaphora aequilonga fertilia, staminodia bene evoluta. Nuculae 5 mm lg. triquetrae brunneae atrato striatae. Receptaculum glabrum, lobis vix notatis.

Typus. Asia media, Seravschan, prope pagum Schink, 28 V 1892, V. L. Komarov (in Inst. Bot. Ac. Sc. asservatur).

*A. S. Trautvetteri* Rgl. foliis ovatis lobis ellipticis vel oblongis (nec foliis oblongis lobis linearibus tortuoso-incisis) calyce 19—20 mm longo (nec 16—18 mm lg.), receptaculo glabro (nec tomentoso) differt. *A. S. Lipskyi* bene distinguitur labio superiore calycino tridentato (nec bidentato), labio superiore corollae inferiore longiore (nec aequilongo).

18. **S. glabricaulis** Pobed. sp. nov. (sect. *Physosphace* Bge.).—*S. Trautvetteri* var. *sarawschanica* auct. fl. Asiae Mediae, non Lipsky.

Perennis. Radix lignosa incrassata apice grisea, in parte inferiore atro-brunnea. Caulis 30—35 cm alt., erectus, simplex vel ramosus; internodium infimum glandulis sparsis longe stipitatis pilisque brevibus vestitum internodia media glabra vel pilis sparsis appressis brevibus obsita, in inflorescentia pilis longis tenuibus pluricellularibus supremis numerosis glandulosis stipitatis vestita. Folia viridia haud numerosa fere omnia radicalia elliptica 5—6 cm lg., 2—2.5 cm lt. (in parte media) lobis plus minusve profunde fissis obtuse dentatis, supra pilis sparsis appressis tecta vel subglabra subtus pilis longis tenuibus pluricellularibus brevioribus glandulisque stipitatis vestita; petioli laminae aequilongi vel vix ea longiores pilis longis tenuibus squarrosis glandulisque longe stipitatis obsiti. Folia caulina trina in 2—3 nodis inferioribus minora brevipetiolata vel sessilia. Folia floralia elliptica ovata indivisa integerrima apice longe attenuata margine longe tenuiter ciliata supra subglabra vel pilis solitariis appressis, subtus glandulis stipitatis vestita. Inflorescentia ramosa, verticillastris 2—3-floris. Pedicelli calyci aequilongi bracteolis parvis viridibus pilis simplicibus tenuibus glandulisque longe stipitatis obsiti. Calyx 10—16 mm lg. rubescens basi haud angustatus glandulis stipitatis pilisque simplicibus pluricellularibus vestitus, labia superiora et inferiora bidentata (dens medius nullus) dentibus triangularibus haud profunde subulatis. Corolla calyce duplo-triplo longior, tubus fauce dilatatus extus pilis tenuibus tomentosis tectus; labium superius inferiori aequilongum apice emarginatum marginibus reflexis, lobi laterales labii inferioris late triangulares lobo medio rotundato aequilongi. Stamina et stylus vix exserti, thecaphora rubida pilis tenuibus tomentosa. Staminodia evoluta. Nuculae ignotae.

Typus. Pamiro-Alaj. Kansai, in jugo Okurtau prope Kisilkan 18 V 1938, n° 237, N. Azbukin.

A proxima *S. lilacinocoerulea* Nevski caule subglabro pilis solitariis sparsis brevibus tecto (nec pilis longis pluricellularibus tenuibus strictis glandulisque stipitatis vestito), corolla extus antheraeque pilis arachnoideis dense tectae (nec glabrae vel pilis solitariis munitae) differt.

#### 19. Subgen. **Macrosphace** Pobed. subg. nov.

Calyx tubuloso-campanulatus postea vix auctus; labium superius dentibus longis tenue-subulatis. Corollae labium superius latum (latitudine longitudinem superante) apice truncatum marginibus reflexis raro non reflexis, tubus plus minusve longus intus piloso annulatus. Fila staminum connactivis longiora, crus anticum postici dimidio brevius, thecaphora fertilia. Staminodia parvula. Verticillaster biflorus pedicelli longi bracteolis parvulis in medio vel supra ornati. Planta suffruticosa ramosa, foliis parvis haud numerosis.

Subgenus endemicum Asiae Mediae.

Typus subgeneris: *Salvia Schmalhauseni* Rgl.

20. **S. intercedens** Pobed. sp. nova (Sect. *Horminum* (Moench) Benth.). — *S. viridis* auct. fl. Asiae mediae.

Annua. Caulis 8—30 cm alt., erectus ramosus, inflorescentia brevior in parte inferiore pilis longis 6—8-cellularibus et glandulis longe stipitatis dense obsitus vel breviter appresse pubescens; folia elliptica 1—3 cm lg., 0.8—1.5 cm lt. basi cuneata subpubescentia tomentosa et glandulis parvis vestita, supra pilis 3—4-cellularibus sparsis vel in fasciculis, inter nervos, marginibus crenata longiuscule petiolata, petiolis laminae aequilongis vel ea brevioribus; folia media minora breviter petiolata; folia floralia rhomboideo-obovata apice attenuata sessilia vel breviter petiolata subtus marginibusque pilis longis 4—6-cellularibus supra pilis brevibus sparsis vestita bracteis duabus longis longe ciliatis praedita, folia floralia suprema nulla vel minora, viridia ut cetera pubescentia. Inflorescentia simplex terminalis, 7—9 verticillastris distantibus 1—2 cm, 4—6-floris; flores pallide violacei labio inferiore corollae fere albo; pedicelli dense breviter appresse pubescentes pilis longis pluricellularibus glandulisque stipitatis intermixtis. Calyx 13-costatus, 10—12 cm lg. extus costis pilis longis 3—4-articulatis glandulisque longestipitatis inter costas pilis brevibus appressis vestitus; labium superius tridentatum dentibus inaequilateralibus medio brevissimo; labium inferius bidentatum dentibus lanceolatis mucronatis; corolla calyce sesquilongior, tubo in calyce incluso labium superius erectum vixve concavum extus ob pilos breves tomentosum, labii inferioris lobus medius rotundato reniformis vel late ellipticus, pateriformis emarginatus, lobis lateralibus oblongis strictis; thecaphora inferiora sterilia dilatata rectangula profunde emarginata; stylus exsertus; nuculae ovato-ellipsoideae, fuscae, 3—3.25 mm lg., laeves.

Habitat in declivibus lapidosis Turcomaniae.

Typus. Kopet-dagh, Karakala, in lapidosis ad pedes montium Sjun, 7 VII 1931, I. A. Linczevski (in Herb. Inst. Bot. Ac. Sc. conservatur).

Nostra species affinis *S. viridi* L. sed calyce, foliis floralibus cauleque (interdum solum in inflorescentia) glandulis numerosis stipitatis vestiti sat distinguitur.

21. **S. nachiczevanica** Pobed. sp. nova (Sect. *Stenarrhena* (D. Don) Briquet, subsect. *Holomosphace* (Bge.) Briquet). — *S. Kotschy* Grossh. in Acta Bot. Inst. Azerbaid. Fil. Acad. Sc. I (1936) 245, non Boiss.

Perennis. Radix lignosa crassa; caules 30 cm alti, pauci, erecti, simplices, foliosi, e basi pilis longis tenuibus glandulisque stipitatis vestiti, in inflorescentia pilis glandulosis densius tecti; folia radicalia elliptica, 2—4.5 cm lg., 1.2—2 cm lt., rotunda, obtusa crenata rugosa utrinque pilis longis tenuibus intricatis vel tomentosis glandulisque breve stipitatis



tecta, petiolis 2—3-plo lamina longioribus pilis longis tenuibus pluricellularibus glandulisque longe stipitatis tectis; folia caulina gradatim ad apicem decrescentia subrotunda breviter petiolata, petiolis lamina brevioribus basi dilatatis pilis longis simplicibus glandulisque dense vestitis, superiora sessilia dentibus acutis; folia floralia calyce breviora, late ovata breviter subulata sessilia amplexicaulia integerrima subtus glandulis breviter stipitatis vestita, marginibus longe albo-ciliata, supra pilis sparsis simplicibus tecta vel subglabra. Inflorescentia paniculata verticillastris distantibus, 2—4-floris, supremis sterilibus; flores 2.5 cm lg., pedicelli 1—2 mm lg. vix pubescentes; calyx campanulatus, 15—17 mm lg., extus pilis longis tenuibus pluricellularibus glandulisque longe stipitatis vestitus, dentibus breviter subulatis acuminatis; corolla tubo longo (1.5 cm) in parte inferiore glabro, e calyce sat exserta, galea labio inferiore brevior vel eo subaequilonga, suberecta, lobi laterales labii inferioris oblongi suberecti, lobus medius late obovatus pateriformis; stamina et stylus e corolla exerti; nuculae ignotae.

*T y p u s.* Transcaucasia, respublica Nachiczewan, ad fl. Diza-tshaj, in ripa glareosa, 7 VI 1934, L. Prilipko (in Herb. Leninopolitano conservatur).

A proxima *S. spinosa* L. foliis floralibus subtus glandulis stipitatis vestitis, foliis caulinis subrotundis albo-floccosis (nec ellipticis vel ovatis sparse pubescentibus) calyce pilis glandulosis densius tecto sat differt.

22. ***S. hajastana*** Pobed. sp. nova. (Sect. *Stenarrhena* (D. Don) Briquet, subsect. *Gongrosphaceae* Briquet). — *Salvia Grossheimii* auct. fl. Cauc., non Sosn.

Perennis. Rhizoma lignosum brunneum; caules solitarii, 30—35 cm alti, erecti simplices breviter appresse pubescentes, in inflorescentia non glandulosa, folia oblonga, 6—10 cm lg., 2.5—3 cm lt. obtusa basi cuneata vel rotundata margine subintegerrima vel vix inaequaliter dentata, rugosa, supra inter nervos pilis tenuibus brevibus oblecta, subtus subtomentosa, folia inferiora petiolis laminae aequilongis praedita, folia caulina minora brevipetiolata vel sessilia, folia floralia inferiora lanceolato-ovata sessilia amplexicaulia viridia rugosa, superiora subrotunda, longe attenuata apice mucronata, supra glabra, subtus arachnoidea calyce breviora. Inflorescentia simplex vel duobus ramis brevibus praedita, verticillastris distantibus, 1—1.5 cm inferioribus 3 cm, 4—6-floris, flores 2.5—3 cm lg., pedicelli 2—3 mm lg. breviter pubescentes; calyx campanulatus, 8—10 mm lg. pilis brevibus tenuibus crispis dense tectus, labium superius rotundum inferiori subaequilongum dentibus approximatis, dente medio brevissimo, corolla calyce 2.5-plo longior, tubo e calyce vix exserto; galea lata falcata labio inferiore valde longior apice truncata emarginata pilis sparsis pluricellularibus violaceis tecta, labium inferius lobis lateralibus ellipticis latis obtusis, lobo medio late obovato vix pateriformi,

thecaphora sterilia membranacea; stamina stylusque ex labio superiore exerti; nuculae ignotae.

*Typus.* Respublica autonoma Nachiczewan, distr. Schachbus, montes prope Bitezenach, 1600—1700 m, 27 V 1947, A. Grossheim, I. Iljinskaja et M. Kirpicznikov (in Herb. Leninopolitano conservatur).

A *S. Grossheimii* Sosn. bene differt labii superioris calycis dentibus tribus approximatis (nec distantibus), calyce pilis tenuibus crispis brevibus vestito (nec pilis longis pluricellularibus glandulosisque), corolla 2.5—3 cm longa (nec 1.5—2 cm), galea lata, lobo medio labii inferioris vix pateriformi; axis et rami inflorescentiae pilis glandulosis destituti.

**23. *S. karabachensis*** Pobed. sp. nova. (Sect. *Stenarrhena* (D. Don) Briquet, subsect. *Gongrosphaceae* Briquet).

Caulis 40—60 cm alt. erectus simplex a basi pilis longis tenuibus perplexis vel solum pilis brevissimis vestitus, in inflorescentia glandulis longestipitatis dense tectus; folia oblongo-ovata (9)11(14) cm lg., (5)6(7) cm lt. obtusa basi rotundata marginibus grossedentata, supra subglabra vel inter nervos pilis pluricellularibus tenuibus, subtus pilis sparsis longis tenuibus tecta, folia inferiora et media breviter petiolata; folia superiora sessilia minora, folia floralia lanceolata vel late lanceolata, superiora (rotundata) amplexicaulia longe acuminata sessilia viridia, membranacea marginibus viridia integra utrinque arachnoidea sub anthesi retroflexa, calyce breviora. Inflorescentia simplex vel basi ramis duobus brevibus divaricatis, verticillastris 4—9, distantibus 2—5 cm, 4—6-floris; flores 2—3 cm lg., pedicelli 3—4 mm lg. breviter patenter pubescentes; calyx 10—12 mm lg. late campanulatus extus pilis simplicibus pluricellularibus glandulosisque longe stipitatis dense vestitus, labium superius rotundatum dentibus erectis distantibus, dente medio lateralibus 3—4-plo breviora, labium inferius duobus dentibus ovatis dimidio calycis aequilongis, corollae tubo plus minusve longo, galea lata falcata apice emarginata, extus praecipue apice pilis pluricellularibus lutescentibus violaceis oblecta; labium inferius lobis lateralibus oblongis acutis strictis lobo medio late attenuato vix pateriformi; stamina et stylus ex labio superiore valde exserti; thecaphora sterilia membranacea rectangula. Nuculae ignotae.

*Typus.* [Aserbajdschan distr. Zangelanskyi, prope pagum Pirczevan, inter frutices, 400 m s. m., 14 V 1948, fl., A. Grossheim, M. Kirpicznikov et L. Smoljaninova (in Herb. Leninopolitano conservatur).

A proxima *S. Grossheimii* Sosn. sat differt foliis majoribus 9—16 cm lg., 5—7 cm lt. (nec 5.5—9 cm lg., 1.5—3 cm lt.), laevibus, solum marginibus vix rugosis supra subglabris vel pilis fascicularibus sparsis subtusque longis tenuibus ad nervos vestitis (nec rugosis, arachnoideis).

**24. *S. Andreji*** Pobed. sp. nova (Sect. *Stenarrhena* (D. Don) Briquet, subsect. *Gongrosphaceae* Briquet).

Perennis. Caules solitarii vel bini, 30—50 cm alt., simplices erecti a basi pilis longis pluricellularibus tecti; folia radicalia non numerosa elliptica 7—9.5 cm lg. 3.5—4.5 cm lata, obtusa marginibus duplicato-dentata vel sublobata supra glabra vel pilis sparsis ad nervum principale, subtus pilis sparsis longis taeniatis brevibus crassis oblecta ad nervos vix pubescentes; petiolis lamina triplo brevioribus, pilis pluricellularibus implicatis dense pubescentibus; folia caulina media et superiora ovata subcordata marginibus vix lobata brevipetiolata vel sessilia, superiora amplexicaulia lanceolata; folia floralia inferiora late lanceolata longiacuminata amplexicaulia lobata, subtus pilis pluricellularibus implicatis dense vestita, superiora subrotunda subito acuminata calyce duplo breviora viridia vel violacea praecipue marginibus sub anthesi reflexa subtus marginibusque pilis longis taeniatis tecta, supra glabra vel breviter sparse pubescentia. Inflorescentia simplex vel paribus ramulorum breviorum praedita 17—19 verticillastris distantibus 1—1.5 cm 4—6-floribus; flores 15—17 mm lg. violacei pedicellis 1.5—2 cm lg. dense pilosis; calyx 8—10 mm lg. usque ad dimidium incisus pilis longis pluricellularibus interdum glandulis longe stipitatis dense vestitus; labium superius rotundatum tridentatum dentibus brevibus aequilongis conniventibus, corolla calyce duplo longior, tubo e calyce vix exserto, galea falcata labio inferiori subaequilonga vel eo vix longior extus pilis brevibus albis glandulisque sessilibus tecta, labii inferioris lobo medio late obovato magno pateriformi lobisque lateralibus late ellipticis obtusis; thecaphora sterilia vix emarginata; stylus e corolla exsertus, violaceus, breviter sparse pubescentes; nuculae ignotae.

Typus. Transcaucasia. Jugum Zangezur, in declivibus austrooccidentibus in rupibus basalticis ad pagum Busgov, 6 VII 1952, An. A. Fedorov (in Herb. Leninopolitano conservatur).

Clarissimo Andreji Fedorovii florum Caucasi investigatori diligentissimo hanc speciem dedico.

Affinis *S. verbascifoliae* M. B., a qua bene differt floribus violaceis 1.5—1.7 cm lg. (nec albolutescentibus 2—2.5 cm lg.) verticillastris parum distantibus 1—1.5 cm lg. (nec 1—2.5), caulibus in inflorescentia pilis simplicibus densius pubescentibus (glandulis longe stipitatis deficientibus).

25. ***S. brachyantha*** (Bordz.) Pobed. comb. nov. (Sect. *Stenarrhena* (D. Don) Briquet, subsect. *Gongrosphaceae* Briquet). — *S. modesta* Boiss. var. *brachyantha* Bordz. in Mém. Kiev. Soc. natur. XXV (1915) 113; Грощ. Фл. Кавк. III, 320.

Perennis. Caulis 20(30) 50 cm alt., erectus simplex, folia fere omnia radicalia, oblonga vel oblongo-ovata (4) 7(10) cm lg., (2) 3(3.5) cm lt., obtusa basi rotundata vel cuneata margine eroso-dentata, interdum lobata, rugosa, utrinque arachnoidea, petiolis lamina longioribus, folia caulina breviter petiolata minora, folia floralia infima sessilia tenuia longe-attenuata



pubescentia, suprema membranacea interdum violacea ovata mucronata parva calyci aequilonga vel eo duplo breviora. Inflorescentia paniculata, verticillastri 8—10, uno supremo sterili, distantes 1.5—2.5 cm, inferiores 3 cm, 4—6-flori; corolla violacea calyce vix exserta; calyx campanulatus fructificatione paulo auctus et tunc folio floralio longior, 6—7 mm lg., pilis tenuibus crispis perplexis pilisque pluricellularibus vestitus; dens medius labii superioris lateralibus duplo brevior, labium inferius dentibus duobus majoribus calyce duplo brevius, dentes longi subulati; corolla 8—11 mm longa tubo in calyce incluso; labia subaequilonga vel inferius galea longius, galea angusta vix falcata, apice emarginata pilis brevibus dense vestita, labium inferius lobis lateralibus oblongis lobo medio late obovato pateriformi emarginato; thecaphora sterilia medio profunde emarginata, stylus e corolla vix exsertus; stigma violaceum lobis crassis inaequalibus; nuculae triquetro-ellipsoideae, 3 mm lg. pallide fuscae.

Typus. Armenia, inter montes Alagez et Bugut-lu, prope pagum Nastara, VI 1875 n° 195, fl., Radde (in Herb. Leninopolitano conservatur).

A proxima *S. modesta* Boiss. bene differt foliorum floralium calycumque pubescentia arachnoidea (nec pilis dilatatis strictis glandulisque longe stipitatis vestita), tubo corollae labioque inferiore in calyce incluso (nec tubo corollae e calyce exerto), floribus minoribus.

## 26. Sect. **Macrocalyx** Pobed., sect. nova.

Calyx campanulatus tempore fructificationis sesqui auctus, labium superum dentibus tribus erectis. Galea vix incurva, labii inferiori subaequilonga vel eo brevior. Folia floralia sine stipulis. Herbae perennes.

Species unica: *S. insignis* Kudr. montibus Pamiro-Alaj (jugum Babatag) propria.

## 27. **S. turcomanica** Pobed. sp. nova (Sect. *Plethiosphace* Benth.).—*S. virgata* auct. fl. As. Mediae.

Perennis. Caules 50—100 cm alt. simplices raro ramosi vel ramosi solum in inflorescentia, erecti, pilis brevibus tenuibus appressis glandulisque breviter stipitatis vestiti, in inflorescentia densius glandulosi; folia radicalia cito marcescentia; folia caulina inferiora oblongo elliptica vel oblongo lanceolata (4) 12 (12.5) cm lg. (1.2) 3.5 (5.5) cm lt. apice obtusata basi rotundata vel vix cordata marginibus bicrenata supra glabra vel nervis principalibus sparse breviter pubescentibus, subtus praecipue ad nervos plus minusve pilis tenuibus brevibus et glandulis breviter stipitatis tecta, petioli lamina breviores, folia caulina media minora acuta breviter petiolata vel sessilia; folia caulina superiora, lanceolata parva sessilia supra et praesertim subtus dense lanata; folia floralia membranacea calyce breviora lanceolato-ovata apice acuminata sessilia amplexicaulia supra sparse breviter appresse pubescentia, subtus pilis brevibus dense vestita. Inflorescentia longa ramosa, raro simplex

verticillastris 12—18 supremis approximatis inferioribus distantibus 4—6-floris; flores violacei pedicellis calyce duplo brevioribus, stricto pubescentibus fructificatione deflexis; calyx 8—9 mm lg. ad nervos breviter pubescens; labium superius inferiore brevius semirobundum dentibus tribus minimis, dentes labii inferioris majores lanceolati; corolla calyce 2.5-plo longior, galea labio inferiore vix longior, erecta vel vix deflexa extus pilis brevibus simplicibus dense vestita; labium inferius lobis lateralibus oblongis obtusis strictis loboque medio late rotundato pateriformi margine undulato; stamina ex galea non excedentia, stylus eam vix superans; nuculae laeves elliptico triquetrae, fuscae, 1.5—2 mm lg.

Habitat in rupium fissuris montium Asiae Mediae.

Typus: Turcomania, in angustiis Yoldere, 25 V 1912, N. I. Samokisch (in Herb. Leninopolitano conservatur).

A proxima *S. virgata* Jacq. foliis floralibus lanceolato-ovatis apice longe attenuatis (nec rotundatis et mucronatis) numero verticillastrorum 12—20 (nec 20—40), approximatis (non distantibus), pubescentia glandulosa nulla differt.

**28. *S. tesquicola*** Klok. et Pobed. sp. n. (Sect. *Pletiosphace* Benth.). — *S. silvestris* Ldb. Fl. Ross. III (1847—1849) 365, non L.; Benth. Lab. 237 p. p.; Ej. in DC. Prodr. XII, 292 p. p.; Boiss. Fl. or. 628, non L.; Schmalh. Fl. II, 320 p. p.; Kryl. Fl. Sib. occid. IX, 2371 p. p. — *S. nemorosa* Grossh. Fl. Cauc. III (1932) 324, non L. — *S. nemorosa* L. f. *albi flora* N. Pop. ex Grossh. Фл. Кавк. III (1932) 324. — **lc.**: Rehb. Ic. bot. tab. 527.

Perennis. Caulis a basi pilis tenuibus pluricellularibus glandulisque parvulis breviter stipitatis obtectus; folia saepe ovato-oblonga, (3.5)7(11) cm lg., (1.2)2.5(4) cm lt. rugosa, utrinque velutino pubescentia glandulisque breviter stipitatis vestita, folia caulina superiora rotunda apice longe acuminata marginibus acute dentata; folia floralia longe acuminata sed interdum *S. nemorosae* similia, frequenter rotundata acuminata marginibus longe albociliata. Flores 8—12 mm lg.; calyx ad  $\frac{1}{3}$  vel  $\frac{1}{4}$  dissectus, sed saepe calyci *S. nemorosae* similis, semper pilis longioribus densius pubescens in tubo corollae pili squamulosi nulli vel vix conspicui; lobus medius labii inferioris rotundus pateriformis; characteribus caeteris *Salviae nemorosae* similis.

Typus: Prov. Voroneshensis, Kamennaja steppa, Nishne-Oserskaja baka, in declivibus stepposis, 2 V 1913, P. P. Orlov.

A proxima *S. nemorosa* L. calyce pilis longioribus strictis dense pubescentibus (nec pilis brevissimis appressis ad nervos), floribus 8—16 mm lg. (nec 8—10 mm), lobo medio corollae ad calycem non appresso distinguitur. A *S. deserta* Schang. foliis floralibus mucronatis, calyce longioribus, violaceis, strictis, fructificatione persistentibus (nec foliis lanceolato-ovatis longe acuminatis calycibus brevioribus, viridibus vel

inferioribus viridibus, superioribus pallide violaceis, postea reflexis) caule basi paucipubescente (nec e basi pilis longioribus densioribusque pubescente).

29. **S. fugax** Pobed. sp. n. (Sect. *Plethiosphace* Benth.). — *S. silvestris* auct. fl. Cauc.

Perennis. Caulis 30—80 cm alt., simplex vel ramosus ramis tenuibus longis saepe cauli principali aequalibus, foliosus pilis brevibus simplicibus appressis dense vestitus, in inflorescentia densius pubescens; folia media et inferiora ovato-oblonga vel oblonga, (4) 5—5.5 (6) cm lg., (1) 2 (2.5) cm lt. obtusata vel acuta, cordata vel rotundata bicrenata utrinque velutino pubescentia supra viridia subtus grisea rugosa; folia caulina superiora et ramulorum minora lanceolata sessilia; folia floralia subrotundata plus minusve attenuata sessilia amplexicaulia, inferiora viridia, superiora subviolacea utrinque (subtus magis) pilis brevibus appressis dense oblecta marginibus ciliatis longis albis postea deflexa. Inflorescentia ramosa, verticillastris 15—25, distantibus 0.5—2.5 cm, 4—6-floris; flores 8—15 mm lg., pedicellis calyci dimidio aequalibus, dense breviterque pubescentibus, bracteis parvis linearibus villosis; calyx 5—8 mm lg. usque ad dimidium incisus fructificatione deciduus extus pilis brevibus dense pubescens; labium superius rotundatum tridentatum, dente medio lateralibus brevioribus vel aequilongis, labium inferius profundius dissectum; corolla calyce sesqui longior, extus pilis albis brevibus vestita, galea suberecta apice dilatata emarginata; labium inferius lobo medio obovato profunde emarginato marginibus villosis, lobis lateralibus ellipticis strictis; stamina sub galea inserta, staminodia parva, stylus vix exsertus, nuculae 1.75 mm lg., sphaericae, depressae brunneae asperae.

Typus. Daghestania, distr. Temir-Chan-Schura, ad viam inter Czir-jurt et Humaly, 27 VI 1897, Th. Alexeenko (in Herb. Leninopolitano conservatur).

Ab omnibus speciebus seriei *Nemorosae* calycibus fructificatione deciduis bene distinguitur, a *S. tesquicola* Klok. et Pobed. foliis floralibus viridibus reflexis diversa est.

### 30. Subgenus **Sanglakia** Pobed. subgen. nov.

Calyx tubulosus sub anthesi immutatus, postea deciduus. Tubus corollae annulo pilorum regulare (nec obliquo) praeditus. Inflorescentia racemosa laxa flores in axillis foliorum floralium solitarii bracteati. Galea profunde bilobata, labium inferius trilobatum lobis subaequilongis vix reflexis. Filamenta connectivae subaequilonga vel ea longiora, connectiva ejusdem continuatio est, thecaphora sterilia nulla, crus inferius breviter subulatum, lobi disci hemisphaerici in fructu ligulati inter nuculas appressi. Frutices humiles dense pubescentes foliis parvis integris.

Subgenus monotypicum: *S. baldshuanica* Lipsky in Pamiro-Alaj (jugum Sanglak).



## SCHRADERIA Medik.

31. Sectio **Holochilus** Pobed. sect. n. — Calycis labium superius integerrimum, folia floralia persistentia; antherarum loculi antici fertiles cohaerentes.

Sectionis typus: *S. bucharica* (M. Pop.) Nevski.

32. Sectio **Odontochilus** Pobed. sect. n. — Calycis labium superius brevissime tridentatum, dente medio obtuso lato, dentibus lateralibus brevibus triangularibus brevissime acuminatis; folia floralia cito decidua, antherarum loculi antici cassi.

Sectionis typus: *S. Korolkovii* (Rgl. et Schmalh.) Pobed.

## ZIZIPHORA L.

33. **Z. Bungeana** Juz. sp. nova.

Suffrutex odoratissimus; radix lignescens flexuosa; rhizoma quoque lignescens, ramosum; caules numerosi, 12—30 cm alt., flavescens, basi paullo ascendentes vel suberecti, simplices vel ramosi, stricti vel plerumque curvati, rarius flexuosi, pilis brevibus reclinatis dense tecti et imprimis in superiore caulium parte (juxta inflorescentiam) ubi hi ultimi albescunt; folia 0.5—1.5 cm lg., 1.5—6 mm lt., anguste lanceolata vel ovato lanceolata, basin apicemque versus angustata apice acuta vel rarius obtusiuscula, integerrima, fere glabra vel saepius utrinque vel solum infra minute (quasi pruiniformiter) puberula, distinctissime punctata, nervis utrinque 2—3 in numero subtus plerumque valde prominentibus; petioli ad 4 mm lg., pilis brevissimis dense pubescentes. Folia floralia caulinis similia sed notabiliter minora, haud raro lineari-lanceolata usque linearia, plerumque suberecta (calyceque appressa) vel horizontaliter patentia sed vulgo haud recurvata margine eciliata; inflorescentiae ad apices caulium ramorumque sitae capitatae plerumque semiglobosae 1.5—2 cm in diametro, laxiusculae, relative haud multiflorae; pedicelli breves aut sat longi ad 1.5—3 (4) mm lg.; calyces plerumque relative breves et angusti ca. 5 mm lg. ob pubescentiam densam brevissimam solum sub lente bene visibilem canescentes, glandulis punctiformibus bene transparentibus; dentes calycini sat acuti tempore florendi saepe paullo patentes, post anthesin erecti et vulgo haud conniventes vel imperfecte conniventes et ideo bene distincti; corolla ad 8 mm lg., calyce subsesqui longior, rosea, tubo vix exserto, limbo sat amplo.

Habitat in rupestribus, in lapidosis, in schistosis et argillosis sicut in steposis Asiae Mediae.

Typus: In monte infra Batovsky-Piket versus Saisang-Nor, ex Herb. Meyer; in Herb. Inst. Bot. Ac. Sc. URSS asservatur.

Affinitas. Cl. Bunge hanc speciem pro *Z. clinopodioides* Lam. habuit, a qua tamen optime distinguitur habitu, foliis angustis, inflorescentia semiglobosa neque sphaeroidea, calycibus minutissime puberulis etc.

*A. Z. serpyllacea* M. B., quam magis refert, imprimis calycis dentibus alienis distinguitur.

**34. *Z. brevicalyx* Juz. sp. n.**

Perennis, suffruticosa, 20—30 cm alt., radice lignosa robusta, caudicibus elongatis porrectis ramosissimis apice ramorum caules numerosissimos valde tenues et graciles rigidos et fragiles curvatos plerumque ramosos edentibus pallide brunneos pilis haud densis minutissimis recurvatis plerumque persistentibus tectos; folia (laminae) plerumque parva, 0.4—1 cm lg., 1.5—4 mm lat., laete viridia, tenuiter coriacea, supra disperse subtus tota facie sat dense pilis minutissimis vestita solum sub lente visibilibus, lanceolata vel anguste ovata, plana, in medio vel paullo infra medium latissima basin versus in petiolum breviusculum sed bene distinctum sensim angustata apice obtusiuscula, obtusa vel rotundata, subtus nervis lateralibus prominentibus, distincte punctata; petioli ad 2.5 mm lg.; rami laterales plerumque numerosi in superiore parte caulis siti breviusculi erecto patentes haud raro iterum ramosi. Bractee foliis caulinis similes sed minutae calyce breviores; inflorescentiae in apice caulium ramorumque dispositae parvae densiusculae hemisphaericae 1—1.5 cm diam.; pedicelli breves ca. 1 mm lg.; flores 6—8 mm lg.; calyx 3—4.5 mm lg. viridis minutissime puberulus et praeterea pilis densiusculis breviusculis patentibus medium corollae diametrum haud attingentibus vestitus; corolla calycem subduplo superans, tubo valde exserto, limbo relative amplo, in planta sicca albidula.

Habitat in rupibus et declivibus schistosis montium Asiae Mediae (reg. Baissunensis Uzbekistaniae, Tadzhikistania).

Typus: montes Babatag, in rupibus gypsaceis ad decl. SW jugi, adversus pag. Tshagam, 10 VIII 1936, S. Lepeschkin et Muchamedzhanov (sub n° 491); in Herb. Inst. Bot. Ac. Sc. URSS asservatur.

Affinitas. Revocat *Z. rigidam* (Boiss.) H. Braun (plantam transcaasicam et iranica), sed ab ea jam foliis apice obtusiusculis vel obtusis (neque acutis) dignoscenda.

**35. *Z. turcomanica* Juz. sp. nova.**

Suffrutex 15—40 cm alt. radice lignosa et caudice porrecto quoque lignoso ramoso apice caules numerosos tenuiusculos rigidos erectos fere strictos vel paullo flexuosos edente plerumque longe ramosos, interdum fere intricatos pallide brunneos, pilis haud densis minutis recurvatis tectos; rami laterales plerumque numerosi, per totum caulem siti, elongati, erecto patentes vel suberecti, saepe iterum eodemque modo ramificati; folia (laminae) parva vel mediocria 4—10 mm lg., 1—4 mm lt. lanceolata, anguste ovata vel oblonga in media parte latissima, inferne sensim in petiolum bene evolutum angustata, apice obtusiuscula vel obtusa, integerrima vel saepissime dentibus paucis parvis remotis praedita, grisescenti pallide

viridia, haud raro duplicatim plicata, coriacea, supra disperse, subtus ad nervos densiuscule pilis minutissimis fere pruiniformiter pilosa, subtus nervis lateralibus prominentibus, distinctissime punctata; petioli ad 2 mm lg. Folia floralia parva, fere spathulata, calyce multo breviora; inflorescentiae ad apicem ramorum, parvae vel mediocres, semiglabrae vel obconicae, 1—1.8 cm in diam.; pedicelli breves non ultra 1 mm lg.; flores ca. 7 mm lg.; calyx 3.5—5 (vulgo 4) mm lg. viridis minutissime puberulus et praeterea pilis densiusculis breviusculis horizontaliter patentibus tectus medium diametrum calycis non attingentibus; corolla calyce sesqui ad subduplo longior tubo exserto limbo majusculo ca. 3—4 mm lt., in sicco pallida vel pallide rosea.

Habitat in declivibus herbosis montium Turcomaniae.

Typus: Reg. Transcaspica, distr. Aschchabad, Gaudan, in declivibus umbrosis montium 28 VII 1912, leg. N. Androssov et L. Bubyryj; in Herb. Inst. Bot. Ac. Sc. URSS asservatur.

Affinitas. Proxima *Z. brevicalyci* Juz. superdescriptae sed ab ea caulibus tota fere longitudine ramosis ramisque elongatis ut quoque foliis subtus solum ad nervos pilosis diversa.

### 36. *Z. Galinae* Juz. sp. nova.

Suffrutex odoratissimus caudice robusto lignescente caespites densos fere pulvinatos formans, e caudiculis ramosissimis dense aggregatis compositos, caules numerosissimos breves 4—22 cm alt. edentes pro maxima parte steriles et solum singulos florentes in parte superiore elongatos attamen simplices vel superne parum ramosos; hi ultimi tenues, subfiliformes, paullo flexuosi, pilis sparsis vel haud densis brevissimis curvatis vestiti rubescentes, internodiis supremis longissimis; folia parva 3.5—10 mm lg., 1—3.5 mm lat. rigida lanceolata, infra medium latissima, basi in petiolum brevem attenuata, apice acutiuscula vel acuta, integerrima, supra glabra vixve puberula, subtus tota facie disperse vel haud dense pilis minutissimis puberula, sat obscure viridia; nervis subtus vix prominentibus, sat obsolete punctata; ramuli laterales tenuissimi breves. Bractee foliis caulinis similes sed parvae, calyce breviores horizontaliter patentibus vel nonnullae reflexae; inflorescentia parva, 1.3—2 cm lg., semiglobosa, sat compacta; flores ca. 8 mm lg., brevissime pedicellatae, calyx ca. 5 mm lg., angustus, pilis densiusculis horizontaliter patentibus tectus diametro calycis vix brevioribus, obscure purpureus; corolla subsesqui longior, tubo exserto.

Habitat in declivibus lapidosis montium B. Balchany Turcomaniae.

Typus: Turcomania, B. Balchany, ad pag. Djuneshkala (1770 m s. m.) 21 IX 1928, leg. E. Bobrov; in Herb. Inst. Bot. Ac. Sc. URSS asservatur.

Affinitas. Habitu peculiari et calycibus ob pubescentiam longam densissimam albicantibus a *L. turcomanica* Juz. satis distincta.



**37. *Z. interrupta* Juz. sp. nova.**

Suffrutex altus 28—50 cm alt. caulibus in inferiore parte lignescentibus erectis vel suberectis basi et in superiore parte vel tota longitudine ramosis, strictis, crassis et rigidis plerumque rubescentibus vel obscure purpureis minutissime (quasi pruiniformiter) et plerumque haud dense (solum superne sat dense) pubescentibus; rami laterales plerumque numerosi, bene evoluti, simplices, suberecti vel rarius erecto-patentes, stricti; folia (laminae) 8—18 mm lg., 2—5 mm lt., in planta sicca pallide vel sat laete (flavescenti) viridia, sat firma, modice crassa, subtus minutissime et tenuiter (quasi pruiniformiter) pubescentia vel subglabra, supra pruinifera vel subglabra, lanceolata vel late lanceolata in media parte vel paullo supra medium latissima, basin versus sensim et longe in petiolum attenuata, obtusa vel obtusiuscula, ima apice cartilagineo incrassata, integerrima, omnia margine eciliata, nervis lateralibus utrinque 4—6 in numero, vix vel parum prominentibus, glandulis punctiformibus sat distinctis; petioli longiusculi 1.5—3 mm lg. ca. 5-plo (et ultra) laminis breviores minutissime et sat dense puberuli. Folia floralia diminuta oblanceolata omnia margine eciliata, infima saepe reflexa; inflorescentia interrupta, verticillastri inferiores 1—3 remoti vel infimi valde remoti, capitula apicalia oblonga 1—1.8 cm in diam., plerumque laxiuscula; inflorescentiae secundariae (i. e. ramorum lateralium) quamquam minus compositae sed bene evolutae, et tota planta ideo valde polycephala et multiflora; pedunculi ca. 1 cm lg., vel subnulla, pedicelli 1—1.5 mm lg.; flores 6—8 mm lg.; calyx breviusculus 3—4.5 (5) mm lg., sub pubescentia albo villosa plerumque violascens, pilis longiusculis albis dense vel densissime tectus saepe diametrum calycis excedentibus, dentibus peracutis intus dense et longe pilosis; corollae tubo exserto et limbo mediocri, ut videtur, pallide purpureae, labio minute purpureo maculato; antherae et stylus purpurei; nuculae maturae ignotae.

Habitat in glareosis et arenosis ad ripas fluminum Asiae Mediae (montes Pamiroalaj).

Typus e valle fl. Sangardak, Jurtshi-Kattdagana a cl. N. Gontscharov lectus; in Herb. Inst. Bot. Ac. Sc. URSS asservatur.

Affinitas. Planta memorabilis e caeteris speciebus notis melius cum *Z. Biebersteiniana* Grossh. comparanda, attamen valde diversa jam habitu peculiari: caulibus robustis strictissimis ramosissimis, ramis omnibus apice capitulum gerentibus (planta insigniter polycephala!), ramulis superioribus caulis principalis plerumque valde abbreviatis, capitulis eorum ideo subsessilibus et inflorescentia generali quasi longe interrupta; etiam foliis excellit basi anguste cuneatis, apice obtusiusculis vel obtusis.

**38. *Z. tomentosa* Juz. sp. nova.**

Suffrutex radice tenuiusculi flexuoso et caudice ramoso prostrato; caules haud numerosi prostrati vel ascendentes flexuosi 7—22 cm lg. disperse et breviter pilosi plerumque rubescentes simplices vel ramulis

haud numerosis patentibus praediti, internodiis superioribus sat elongatis; folia 4—12 mm lg., 2—8 mm lat., oblonga vel fere rotundata, petiolo ad 2 mm lg., apice obtusa vel rarius acutiuscula, integerrima, haud crassa, laete viridia, laeviter breviter et tenuiter pubescentia vel fere glabra, punctato-foveolata, subtus nervis parum prominentibus. Folia floralia caulinis similia sed minora, plerumque calyce haud vel parum longiora, plerumque recurvata, paullo undulata; capitula subglobosa vel saepius semiglobosa, 1.2—2 cm in diam., laxiuscula, verticillastro infimo haud raro a capitulo remoto; pedicelli breves sed plerumque bene conspicui, ad 1.5 mm lg.; calyx 4—5 mm lg., densiuscule vel dense patulo pilosus pilis albis diametrum calycis attingentibus, vulgo obscure purpureus; corolla tubo fere exserto limbo amplo, pallide purpurea; antherae e tubo corollae exsertae.

Habitat in vallibus fluminum Tianschanicorum, in schistosis montium.

Typus: Reg. Narynski, vallis Aksaj, in parte media, loco dicto Tshunkej-saj, 14 VII 1912, fl., leg. V. Antonov; in Herb. Inst. bot. Ac. Sc. URSS asservatur.

Affinitas. Specie subsequenti, *Z. pamiroalaicae* Juz. valde affinis, nonnullis tamen notis jam ad *Z. clinopodioidem* Lam. vergit et ideo est forma inter ambas commemoratas quasi intermedia.

### 39. *Z. pamiroalaica* Juz. sp. nova.

Suffrutex odoratissimus radice robusto lignoso flexuoso et caudice quoque lignoso ramosissimo prostrato, caules edente numerosos tenuiusculos vel haud raro sat robustos plerumque basi ascendentes vel etiam prostratos et arcuatim curvatos haud raro flexuosos 7—30 cm alt., pilis rigidiusculis dispersis brevibus recurvatis tectos, plerumque rubescentes, simplices vel ramulis haud numerosis suberectis vel paullo patentibus praeditos, in inferiore parte vel interdum per totum caulem dispositis, internodiis haud raro valde elongatis, imprimis in superiore parte plantae; folia haud magna vel mediocria, 2—15 mm lg., 1.5—7 mm lt., oblongo ovata vel fere rotundata, haud raro duplicatim plicata, basi in petiolum distinctum minute puberulum attenuata ad 3 mm lg., apice obtusa vel acutiuscula, integerrima, superne denticulis haud numerosis (utrinque plerumque 1—2) praedita, crassiuscula, grisescenti vel sat obscure viridia, pilis sparsis vel densiusculis brevibus et tenuibus vestita, interdum subglabra, nervis subtus plerumque parum prominentibus distince glanduloso-punctata. Bracteae foliis caulinis similes, sed saepius minores, calycem vulgo non superantes, saepe reflexae; inflorescentiae capitula globosa, 1.2—2.8 cm in diam., sat compacta; pedicelli brevissimi; calyx 4—6 mm lg., erectus vel parum curvatus, pilis longis albis molliusculis dense tectus diametrum calycis fere aequantibus vel paullo longioribus, viridis vel sat intense purpureus; corolla tubo paullo exserto limbo amplo, rosea; antherae e tubo longe exsertae, purpurascentes.

*Habitat* in lapidosis et in schistosis in vallibus fluvium et in declivibus faucium Asiae Mediae (montes Pamiroalaj). Typus e valle Alaj a S. Juzepczuk a. 1930 lectus in Herb. Inst. Bot. Ac. Sc. URSS asservatur.

*Affinitas.* A praecedente differt inflorescentiis magis compactis perfecte globosis, floribus brevissime pedicellatis, calycibus (sub pubescentia) plerumque viridibus vel leviter purpureis (neque obscure purpureis), pilis calyces vestientibus saepius densissimis atque diametrum eorum aequantibus aut superantibus.

**40. *Z. Raddei* Juz. sp. nova.**

*Suffrutex* 5—15 cm alt. caulibus basi lignescentibus et ascendentibus plerumque simplicibus valde flexuosis plerumque rubescentibus et pilis densiusculis et breviusculis patentibus paulo flexuosis tectis; folia inferiora 4—7 mm lg., 1.5—5 mm lt., superiora ad 1 cm lg. et 7 mm lt., ovata usque fere rotundata, apice acuminata, haud raro undulata, omnia integerrima utrinque densiuscule vel disperse breviuscule vel sat longe patulo pilosa pilis plerumque curvatis, nervis subtus prominentibus vel parum prominentibus, glanduloso punctata; petioli sat bene evoluti, patulo pilosi. Folia floralia ampla, caulinis similia dimensiones supremas eorum aequantia, margine inferne plerumque longe ciliata, plerumque horizontaliter patentia vel interdum singula recurvata; inflorescentiae laxiusculae solitariae plerumque semiglobosae 1.5—2.5 cm in diam.; pedicelli sat bene evoluti, 1—2 mm lg.; flores 8—12 mm lg.; calyx 5—6 mm lg. sat angustus, plerumque violaceus, pilis densiusculis vel densis patentibus diametrum calycis aequantibus vel subbrevioribus tectus, dentibus acuminatim lanceolatis tubo multoties brevioribus; corolla tubo exserta, sicca albida.

*Habitat* in montibus Transcaucasiae australis.

*Typus:* Armenia, in monte Ararato majore, lac. Kupgol, 8 VIII 1871, leg. G. Radde; in Herb. Inst. Bot. Ac. Sc. URSS asservatur.

*Affinitas.* A proxima *Z. Biebersteiniana* Grossh. differt statura humili, caulibus patulo-pilosis ut quoque florum capitulis solitariis parvis semiglobosis; a *Z. Gundelsheimeri* C. Koch (mihi ex authopsia ignota) foliis floralibus minoribus non ovato-lanceolatis sed rotundato-ovatis marginibus non revolutis diversa ut quoque pilis calycum eorum diametrum plerumque aequantibus (confer descriptionem Kochianam).

**41. *Z. denticulata* Juz. sp. nova.**

*Suffrutex* mediocris basi ramosus ut videtur odoratus, 13—25 cm alt. caulibus (sive ramis primariis) caeterum simplicibus vel iterum ramosis, in inferiore parte lignescentibus, breviter arcuato ascendentibus vel fere erectis, paullo flexuosis vel fere strictis sat crassis et robustis rigidiusculis plus minusve purpurascentibus vel (fere) viridibus, pilis parvis vel mediocribus curvatis vestitis in inferiore parte sparsis, superne sat densis;



rami laterales (si adsunt) tenues erecto-patentes vel fere erecti breviusculi vel haud longi simplices, 1—2 paria foliorum evolventes; folia (i. e. laminae) 8—20 mm lg., 4—13 mm lt. sicca pallide viridia paullo coriacea haud crassa utrinque glabra vel subtus ad nervum principalem minute puberula, infima oblonga basi apiceque attenuata, superiora et suprema ovata vel late ovata, in media parte vel paullo infra medium latissima, basi undulatum in petiolum contracta, apice acuta vel breviter acuminata, inferiora integerrima superiora obsolete pauci et minute dentata saepe plicata, suprema inferne margine longe ciliata, nervis lateralibus utrinque 4—5 in numero subtus siccatione prominentibus, obsolete punctata; petioli breves 1—2 mm lg. minute puberuli. Folia floralia infima caulinis superioribus breviora sed fere aequilata, ovata vel fere rotundata usque oblique rotundata (i. e. latiora quam longa), apice acuminata et undulatum plicata, in inferiore parte sicut petioli longe ciliata, capitulum florum quasi modo involucri fulcrantia et plerumque reflexa, superiora subito diminuta; inflorescentiae ad apices caulium sitae dense capitatae subglobosae vel interdum ovoideae, 2—3 cm in diam., laterales valde diminutae plerumque parum evolutae; pedicelli 1—3 (plerumque 2) mm lg.; flores 6—12 mm lg.; calyx 5—7 mm lt. viridis vel interdum violascens, pilis minutis vel minutissimis dense puberulus et praeterea in superiore parte vel solum apice (ad dentes) pilis longis erecto patentibus vel patulis haud densis tectus, corolla plerumque majuscula tubo post anthesin exserto staminibus breviusculis (antheris plerumque e fauce corollae non exsertis); nuchulae ca. 1.5 mm lg. pallide brunneae.

Habitat in declivibus lapidosis montium et in pratis subalpinis Transcaucasiae.

Typus: In declivibus lapidosis mont. Gärgär, VI 1845, leg. Frick (sub nom. *L. media*), in Herb. Inst. Bot. Ac. Sc. URSS asservatur.

Affinitas. A speciebus affinibus differt forma peculiari foliorum floralium et imprimis pubescentia calycum; a *Z. clinopodioides* Lam. praeterea floribus exsertis, a *Z. Woronowii* Maleev — caulibus alio modo pilosis excellit.

#### 42. *Z. borzhomica* Juz. sp. nov.

Suffrutex ad 20 cm alt. siccus inodorus; caules basi prostrati lignescentes a basi ramosi ramis numerosis ascendentibus flexuosis virescentibus vel violascentibus, pilis sat densis brevibus recurvatis tecti; folia (laminae) 6—14 mm lg., 2.5—9 mm lt. pallide viridia (in planta sicca), sat tenuia, utrinque glabra, ovata vel late lanceolata, infra medium latissima, haud raro paullo undulata, basi rotundata vel attenuata, inferiora apice obtusiuscula vel obtusa, superiora attenuata et acuta, versus apicem obsolete paucidentata, superiora inferne usque ad medium longe ciliata, caetera eciliata, nervis lateralibus utrinque 3—4 in numero, solum in foliis supremis et floralibus prominentibus, caeterum parum conspicuis, obsolete punctata,

petiolis 1—2 mm lg. laminae multoties brevioribus, foliorum inferiorum glabris, superiorum parce pilosis. Folia floralia infima caulinis superioribus similia, quam ea vix latiora recurvata, caetera minora subrhomboidea fere usque ad apicem longe ciliata, petiolis paullo dilatatis; inflorescentiae ad apices caulium ramorumque sitae, dense capitatae subglobosae; pedicelli ca. 1 (raro ad 2) mm lg.; flores ad 1 cm lg.; calyx 4.5—7 mm lg. viridis pilis sparsis patentibus breviusculis obsitus; corolla tubo vix exserto limbo amplo ut videtur purpureo labio maculato; nuculae ad 2 mm lg. flavescens.

Habitat in declivibus lapidosis montium et in tragacanthetis Transcaucasiae.

Typus: Stat. Strashnyj Okop prope opp. Borzhom, 5 VII 1888, leg. J. Akinfiew; in Herb. Inst. Bot. Ac. Sc. URSS asservatur.

Affinitas. *Z. denticulata* Juz. sine dubio affinis, differt autem caulibus minus robustis plerumque ascendentibus ramosissimis, foliis floralibus infimis eadem fere forma uti in caulinis (id est haud dilatatis), calycibus pubescentia solum e pilis minutissimis constante vestitis vel pilis longis, si adsunt, per totam longitudinem calycis dispositis.

#### 43. *Z. capitellata* Juz. sp. nova.

Annua, humilis, haud raro nana, 3—8 cm alt., caule plerumque simplici gracili vulgo bifoliato, foliis 3—7 mm lg., 2—5 mm lat. ovatis, ellipticis vel late ovatis, petiolis 1—4 mm lg. Folia floralia 0.5—1.2 cm lg., 0.2—0.9 mm lat., anguste vel late ovata, apice acutata vel breviter acuminata, haud raro arcuatim recurvata; flores 6—10 mm lg.; calyx 5—9 mm lg., corolla tubo haud exserto. Reliqua *L. capitata* L.

Habitat in schistosis montium Asiae Mediae (Karatau, Hissar).

Typus: Montes Karatau, in declivibus glareosis meridionalibus collium prope pag. Vannovskoje, 22 V 1932, fl., leg. N. Pavlov; in Herb. Inst. Bot. Ac. Sc. URSS asservatur.

Affinitas. Bene differt a *Z. capitata* L. foliis caulinis latioribus, floralibus autem angustioribus, necnon dimensionibus totae plantae minoribus.





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## VEGETATION REGIONS OF THE USSR

Abbreviated name	Full name
<b>I. Arctic</b>	
1. Arc. Eur. . . . .	Arctic (European part)
2. Nov. Z. . . . .	Novaya Zemlya
3. Arc. Sib. . . . .	Arctic (Siberia)
4. Chuk. . . . .	Chukchi
5. An. . . . .	Anadyr
<b>II. European part</b>	
6. Kar. -Lap. . . . .	Karelia-Lapland
7. Dv. -Pech. . . . .	Dvina-Pechora
8. Balt. . . . .	Baltic States
9. Lad. -Il'm. . . . .	Ladoga-Il'men
10. U. V. . . . .	Upper Volga
11. V. -Kama . . . . .	Volga-Kama
12. U. Dnp. . . . .	Upper Dnieper
13. M. Dnp. . . . .	Middle Dnieper
14. V. -Don. . . . .	Volga-Don
15. Transv. . . . .	Transvolga area
16. U. Dns. . . . .	Upper Dniester
17. Bes. . . . .	Bessarabia
18. Bl. . . . .	Black Sea area
19. Crim. . . . .	Crimea
20. L. Don. . . . .	Lower Don
21. L. V. . . . .	Lower Volga
<b>III. Caucasus</b>	
22. Cisc. . . . .	Ciscaucasia
23. Dag. . . . .	Dagestan
24. W. Transc. . . . .	Western Transcaucasia
25. E. Transc. . . . .	Eastern Transcaucasia
26. S. Transc. . . . .	Southern Transcaucasia
27. Tal. . . . .	Talysh
<b>IV. West Siberia</b>	
28. Ob . . . . .	Ob region (from the eastern slopes of the Urals to the Yenisei River)
29. U. Tob. . . . .	Upper Tobol



30. Irt. ....	Irtysh
31. Alt. ....	Altai
V. East Siberia	
32. Yenisei. ....	Yenisei
33. Lena-Kol. ....	Lena-Kolyma
34. Ang. -Say. ....	Angara River-Sayans
35. Dau. ....	Dauria
VI. Far East	
36. Kamch. ....	Kamchatka
37. Okh. ....	Okhotsk
38. Ze. -Bu. ....	Zeya-Bureya
39. Uda ....	Uda River area
40. Uss. ....	Ussuri
41. Sakh. ....	Sakhalin
VII. Soviet Central Asia	
42. Ar. -Casp. ....	Aral-Caspian
43. Balkh. ....	Lake Balkhash area
44. Dzu. -Tarb. ....	Dzungaria-Tarbatagai
45. Kyz. K. ....	Kyzyl-Kum
46. Kara K. ....	Kara-Kum
47. Mtn. Turkm. ....	Mountainous part of Turkmenistan
48. Amu D. ....	Amu Darya
49. Syr D. ....	Syr Darya
50. Pam. -Al. ....	Pamir-Alai
51. T. Sh. ....	Tien Shan

Accepted Regions for Indication of General Distribution of  
Species Appearing in "Flora of the U. S. S. R. "

I. Arc. ....	Arctic (Spitsbergen, Greenland and farther)
II. Scand. ....	Scandinavia (Norway, Denmark, Sweden, Finland)
III. Centr. Eur. ....	Central Europe (Germany, Poland, Czechoslovakia, Hungary, Austria, Switzerland)
IV. Atl. Eur. ....	Atlantic Europe (Netherlands, Belgium, England, France, Portugal)
V. Med. ....	Mediterranean (including North Africa)
VI. Bal. -As. Min. ....	Balkan Peninsula and Asia Minor
VII. Arm. -Kurd. ....	Lesser Armenia and Kurdistan
VIII. Iran. ....	Iran and Afghanistan
IX. Ind. -Him. ....	India and Himalayas
X. Dzu. -Kash. ....	[Dzungaria-Kashgar area] Eastern or Chinese Turkestan (Sinkiang)

XI. Mong. . . . .	Mongolia
XII. Jap. -Ch. . . . .	Japan and China
XIII. Ber. . . . .	North American coast of the Bering Sea
XIV. N. Am. . . . .	North America (U. S. A. and Canada)
XV. Tib. . . . .	Tibet

#### Other Geographical Abbreviations

Afr. . . . .	Africa
Aust. . . . .	Australia
Centr. . . . .	Central
E. . . . .	East(ern)
Gr. . . . .	Great, Greater
I. . . . .	Island
Is. . . . .	Islands
Mt. . . . .	Mount
Mts. . . . .	Mountains
N. . . . .	North(ern)
R. . . . .	River
S. . . . .	South(ern)
W. . . . .	West(ern)

#### TRANSLATOR'S NOTE

1. The Russian term "Srednyaya Aziya" is, in English, Central Asia (or Soviet Central Asia). Therefore the term Middle Asia has been used for Russian "Tsentral'naya Aziya," which is non-Soviet inner Asia, comprising western China (Sinkiang and Tibet) and Mongolia.

2. According to Russian usage, the European part of the USSR is "eastern Europe." Therefore "western Europe" includes the whole of Europe outside the USSR.





EXPLANATORY LIST OF ABBREVIATIONS OF RUSSIAN  
INSTITUTIONS AND PERIODICALS APPEARING  
IN THIS TEXT

Abbreviation	Full name (transliterated)	Translation
Bot.-geogr. issled. v Turkest.	Botaniko-geograficheskie issledovaniya v Turkestane	Botanical and Geographical Investigations in Turkestan
Bot. Mat. Gerb. Bot. inst. AN SSSR	Botanicheskie Materialy Gerbariya Botaniches- kogo instituta AN SSSR	Botanical Materials of the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR
Bot. Mat. Gerb. Gl. Bot. Sada	Botanicheskie Materialy Gerbariya Glavnogo Botanicheskogo Sada	Botanical Materials of the Herbarium of the Main Botanical Gardens
Bot. zap. SPb. univ.	Botanicheskie zapiski Sankt-Peterburgskogo universiteta	Botanical Notes of St. Petersburg University
Bot. zhurn. SSSR	Botanicheskii zhurnal SSSR	Botanical Journal of the USSR
Byull. Glavn. Bot. Sada	Byulleten' Glavnogo Botanicheskogo Sada	Bulletin of the Main Botanical Gardens
Byull. Obshch. lyubit. estest- vozn., etnogr.	Byulleten' Obshchestva lyubitelei estestvozna- niya, antropologii i etnografii	Bulletin of the Naturalists', Anthropologists' and Ethnographers' Society
Byull. Voronezh. obshch. estestv.	Byulleten' Voronezhskogo obshchestva estestvo- ispytatelei	Bulletin of the Voronezh Society of Naturalists
Dendr.	Dendrarii	Arboretum
Der. i kust.	Derev'ya i kustarniki	Trees and Shrubs
Der. i kust. Kavk.	Derev'ya i kustarniki Kavkaza	Trees and Shrubs of the Caucasus
Dikie polezn. i tekhnich. raste- niya SSSR	Dikie poleznye i tekhnichesk- skie rasteniya SSSR	Useful Wild Plants and Industrial Crops of the USSR
Dikorastushchie r. Kavkaza, ikh rasprostranenie, svoistva i pri- menenie	Dikorastushchie raste- niya Kavkaza, ikh ras- prostranenie, svoistva i primeneniye	Wild Plants of the Caucasus, Their Distribution, Properties and Uses
Dokl. AN Azerb. SSR	Doklady Akademii Nauk Azerbaidzhanskoi SSR	Reports of the Academy of Sciences of the Azerbaijan SSR

Fl.	Flora	Flora
Fl. Abkh.	Flora Abkhazii	Abkhasian Flora
Fl. Almat.	Flora Alma-Atinskogo	Flora of the Alma-Ata
zapovedn.	zapovednika	Reserve
Fl. Alt.	Flora Altaya	Altai Flora
Fl. Alt. i Tomsk.	Flora Altaiskoi i	Flora of Altai and Tomsk
gub.	Tomskoi gubernii	Provinces
Fl. Az. Ross.	Flora Aziatskoi Rossii	Flora of Asiatic Russia
Fl. Evrop. Rossii	Flora Evropeiskoi Rossii	Flora of European Russia
Fl. Gruzii	Flora Gruzii	Georgian Flora
Fl. Kamch.	Flora Kamchatki	Kamchatkan Flora
Fl. Kavk.	Flora Kavkaza	Caucasian Flora
Fl. Man'chzh.	Flora Man'chzhurii	Manchurian Flora
Fl. Mosk. gub.	Flora Moskovskoi	Flora of Moscow Province
	gubernii	
Fl. Sev. Kraya	Flora Severnogo Kraya	Flora of the Northern
		Territory
Fl. Sakh.	Flora Sakhalina	Flora of Sakhalin
Fl. Sib.	Flora Sibiri	Siberian Flora
Fl. Sib. i Dal'n.	Flora Sibiri i Dal'nego	Flora of Siberia and
Vost.	Vostoka	the Far East
Fl. Sr. Ross.	Flora Srednei Rossii	Flora of Central Russia
Fl. Talysh.	Flora Talysha	Talysh Flora
Fl. Tsentr.	Flora Tsentral'nogo	Flora of Central Kazakh-
Kazakhst.	Kazakhstana	stan
Fl. Vost. Evr.	Flora Vostochnoi Evropeis-	Flora of East European
Ross.	koi Rossii	Russia
Fl. Yugo-Vost.	Flora Yugo-Vostoka	Flora of the Southeast
Fl. Yugo-zap.	Flora Yugo-zapadnoi Rossii	Flora of Southwest Russia
Ross.		
Fl. Yur. bot. -sada	Flora Yur'evskogo botani-	Flora of Yur'ev Botanical
	cheskogo sada	Garden
Fl. Zap. Sib.	Flora Zapadnoi Sibiri	Flora of West Siberia
Gerb. donsk. fl.	Gerbarii donskoi flory	Herbarium of Don Flora
Gerb. Orlovsk.	Gerbarii Orlovskoi	Herbarium of Orel Province
gub.	gubernii	
Gerb. Ukr. fl.	Gerbarii Ukrainskoi	Herbarium of Ukrainian
	flory	Flora
GRF	Gerbarii Russkoi Flory	Herbarium of Russian Flora
Ill. Fl. Mosk. gub.	Illyustrirovannaya Flora	Illustrated Flora of Moscow
	Moskovskoi gubernii	Province
Izv. AN SSSR	Izvestiya AN SSSR	Bulletin of the Academy of
		Sciences of the USSR
Izv. Bot. Sada	Izvestiya Botanicheskogo	Bulletin of the Botanical
	Sada	Gardens
Izv. Bot. Sada	Izvestiya Botanicheskogo	Bulletin of Peter the Great
Petra Vel.	Sada Petra Velikogo	Botanical Gardens
Izv. Gl. Bot. Sada	Izvestiya Glavnogo Bota-	Bulletin of the Main
	nicheskogo Sada	Botanical Gardens
Izv. Kavk. Muzeya	Izvestiya Kavkazskogo	Bulletin of the Caucasian
	Muzeya	Museum

Izv. Kazakhst. fil. AN SSSR	Izvestiya Kazakhstan- skogo Filiala Akademii Nauk SSSR	Bulletin of the Kazakhstan Branch of the Academy of Sciences of the USSR
Izv. Kievsk. Bot. Sada	Izvestiya Kievskogo Botanicheskogo Sada	Bulletin of the Kiev Botan- ical Gardens
Izv. Obshch. lyubit. estest- vozn., antrop. i etnogr.	Izvestiya Obshchestva lyubitelei estestvo- znaniya, antropologii i etnografii	Bulletin of the Naturalists', Anthropologists' and Ethnographers' Society
Izv. Tadzhik. Bazy AN SSSR	Izvestiya Tadzhikskoi Bazy Akademii Nauk SSSR	Bulletin of the Tadzhikistan Base of the Academy of Sciences of the USSR
Konsp. rast. okr. Khar'kova	Konspekt rastenii okruga Khar'kova	Compendium of Plants of Kharkov District
Korm. rast. Estestv. senoko- sov i pastb. SSSR	Kormovye rasteniya estestvennykh senokosov i pastbishch SSSR	Fodder Plants of Natural Hay Meadows and Pastures of the USSR
Lesn. zhurn.	Lesnoi zhurnal	Forestry Journal
Mat. (dlya) Fl. Kavk.	Materialy dlya Flory Kavkaza	Materials on Caucasian Flora
Mat. (dlya) fl. Sredn. Azii	Materialy dlya flory Srednei Azii	Materials on Soviet Central Asian Flora
Nov. obozr.	Novoe obozrenie	New Review
Ob. rast. Kievsk. uch. okr.	Obzor rastitel'nosti Kiev- skogo uchebnogo okruga	Survey of Vegetation in the Kiev Educational District
Och. obozr. i fl. Karpát	Ocherki rastitel'nosti i flory Karpát	Survey of Carpathian Vegetation and Flora
Ocherk. Tifl. fl.	Ocherki Tiflisskoi flory	Survey of Tiflis [Tbilisi] Flora
Opis. Amur. obl.	Opisanie Amurskoi oblasti	Description of the Amur Region
Opis. ist. razv. fl. vost. Tyan'- Shanya	Opisanie istorii razvitiya flory vostochnogo Tyan'-Shanya	Description of the History of the Development of Flora of Eastern Tien Shan
Opis. nov. rast Turk.	Opisanie novykh rastenii Turkestana	Description of New Plants of Turkistan
Opis. nov. vidov	Opisanie novykh vidov	Description of New Species
Opred. der. i kust.	Opredelitel' derev'ev i kustarnikov	Key to Trees and Shrubs
Opred. rast. Dal'nevost. kr.	Opredelitel' rastenii Dal'nevostochnogo Kraya	Key to Plants of the Far Eastern Territory
Opred. rast. Kavk.	Opredelitel' rastenii Kavkaza	Key to Caucasian Plants
Opred. vyssh.	Opredelitel' vysshikh rastenii	Key to Higher Plants
Opred. (vyssh.) rasten. Evrop. chasti SSSR	Opredelitel' (vysshikh) rastenii Evropeiskoi chasti SSSR	Key to Higher Plants of the European USSR



Perech. rast. Turk.	Perechen' rastenii Turkmenii	List of Turkmenian Plants
Pochv. eksped. v bass. r. Syr- Dar'i i Amu- Dar'i	Pochvennaya ekspeditsiya v basseiny rek Syr-Dar'i i Amu-Dar'i	Soil Science Expedition to the Syr-Darya and Amu-Darya River Basins
Putesh. Rast. i fl. Karp.	Puteshestviya Rasteniya i flora Karpat	Travels Plants and Flora of the Carpathians
Rast. letn. pastb. Gandzh.	Rasteniya letnikh pastbishch Gandzhi	Vegetation of Gandzha [now Kirovabad] Summer Pastures
Rast. res. Turkm.	Rastitel'nye resursy Turkmenii	Plant Resources of Turkmenia
Rast. resursy Kavkaza	Rastitel'nye resursy Kavkaza	Plant Resources of the Caucasus
Rast. Sib.	Rastitel'nost' Sibiri	Vegetation of Siberia
Rast. Sr. Az.	Rastitel'nost' Srednei Azii	Vegetation of Soviet Central Asia
Rast. Zakasp. obl.	Rastitel'nost' Zakaspiiskoi oblasti	Vegetation of the Trans- caspian Region
Rastit. Kavk.	Rastitel'nost' Kavkaza	Vegetation of the Caucasus
Rastit. pokrov vost. Pamira	Rastitel'nyi pokrov vostochnogo Pamira	Plant Cover of the Eastern Pamirs
Rastit. syr'e Kazakhst.	Rastitel'noe syr'e Kazakhstana	Plant Resources of Kazakhstan
Rastit. zapovedn. Guralash i Zaaminks. lesn. ugodii	Rastitel'nost' zapovednika Guralash i Zaaminskikh lesnykh ugodii	Vegetation of Guralash Reserve and Zaamin Forest Lands
Rezul't. dvukh puteshevstv. na Kavk.	Rezul'taty dvukh puteshestvii na Kavkaz	Results of Two Travels to the Caucasus
Russk. Fl.	Russkaya Flora	Russian Flora
Russk. lek. rast.	Russkie lekarstvennye rasteniya	Russian Medicinal Plants
Sbor, sushka i raz. lek. rast.	Sbor, sushka i razvitie lekarstvennykh rastenii	Gathering, Drying and Development of Medicinal Plants
Sorn. rast. SSSR	Sornye rasteniya SSSR	Weed Plants of the USSR
Sov. Bot.	Sovetskaya Botanika	Soviet Botany
Spis. rast.	Spisok rastenii	List of Plants
Tr. Bot. inst. AN SSSR	Trudy Botanicheskogo instituta AN SSSR	Transactions of the Botani- cal Institute of the Aca- demy of Sciences of the USSR
Tr. Bot. Sada	Trudy Botanicheskogo Sada	Transactions of the Botanical Gardens
Tr. Bot. Sada Yur'evsk. Univ.	Trudy Botanicheskogo Sada Yur'evskogo Universiteta	Transactions of the Botani- cal Gardens of Yur'ev [now Tartu] University

Tr. Byuro prikl. Bot.	Trudy Byuro po prikladnoi botanike	Transactions of the Bureau of Applied Botany
Tr. Dal'nevost. bazy AN SSSR	Trudy Dal'nevostochnoi bazy AN SSSR	Transactions of the Far Eastern Base of the Academy of Sciences of the USSR
Tr. Inst. nov. lub. syr'ya	Trudy Instituta novogo lubyanogo syr'ya	Transactions of the Institute of New Fiber Raw Materials
Tr. Nauk.-Doslid. Inst. Bot. Khar. Derzh. Univ.	Trudy naukovo-doslidnoho instytutu botaniky Kharkivs'koho Derzhavnoho Universytetu	Transactions of the Botanical Research Institute of the Kharkov State University
Tr. Obshch. isp. prir. Khar'k. univ.	Trudy Obshchestva ispytatelei prirody Khar'kovskogo universiteta	Transactions of Naturalists' Society of Kharkov University
Tr. Obshch. sadov. v Odesse	Trudy obshchestva sadovodov v Odesse	Transactions of the Odessa Horticulturists' Society
Tr. Odessk. obshch. sadov	Trudy Odesskogo obshchestva sadovodov	Transactions of Odessa Horticulturists' Society
Tr. Peterb. obshch. estestvoisp.	Trudy Peterburgskogo obshchestva estestvoispytatelei	Transactions of St. Petersburg Naturalists' Society
Tr. pochv.-bot. eksp. Peresl. upr.	Trudy pochvenno-botanicheskoi ekspeditsii Pereslavskogo upravleniya	Transactions of the Soil-Botanical Expedition of Pereslavl Administration
Tr. po geobot. obsled. pastb. Azerb.	Trudy po geobotanicheskim obsledovaniyam pastbishch Azerbaidzhana	Transactions of Geobotanical Investigations of Azerbaijan Pastures
Tr. Odessk. otd. R. obshch. sadov.	Trudy Odesskogo otdeleniya Rossiiskogo obshchestva sadovodov	Transactions of Odessa Branch of the Russian Horticulturists' Society
Tr. prikl. bot. (gen. i sel.)	Trudy po prikladnoi botanike, genetike i selektsii	Transactions of Applied Botany, Genetics and Selection
Tr. Ross. Obshch. sadov.	Trudy Rossiiskogo obshchestva sadovodov	Transactions of the Russian Horticulturists' Society
Tr. SAGU	Trudy Sredneaziatskogo Gosudarstvennogo Universiteta	Transactions of the Soviet Central Asian State University
Tr. Sarat. obshch. estestvoisp.	Trudy Saratovskogo obshchestva estestvoispytatelei	Transactions of the Saratov Naturalists' Society
Tr. Sil'sko-gospod. komit. bot.	Trudy sil'skohospodar'skoho komiteta botaniky	Transactions of the Botanical Agricultural Committee
Tr. SPb. obshch. estestv.	Trudy Sankt-Peterburgskogo obshchestva estestvoispytatelei	Transactions of the St. Petersburg Naturalists' Society

Tr. Tadzh. bazy AN SSSR	Trudy Tadjhikskoi bazy AN SSSR	Transactions of the Tadjikistan Base of the Academy of Sciences of the USSR
Tr. Tbil. bot. inst.	Trudy Tbilisskogo botani- cheskogo instituta	Transactions of Tbilisi Botanical Institute
Tr. Tbil. (or Tifl.) bot. sada	Trudy Tbilisskogo (Tiflisskogo) botaniche- skogo sada	Transactions of the Tbilisi (Tiflis) Botanical Garden
Tr. Turkmensk. bot. sada	Trudy Turkmenskogo botanicheskogo sada	Transactions of the Turkmenian Botanical Garden
Tr. Turk. nauchn. obshch.	Trudy Turkmenskogo nauchnogo obshchestva	Transactions of the Turkmenian Scientific Society
Vest. Akad. Nauk (or AN) Kazakhsk. SSR	Vestnik Akademii Nauk Kazakhskoi SSR	Bulletin of the Academy of Sciences of the Kazakh SSR
Vestn. estestv. nauk	Vestnik estestvennykh nauk	Bulletin of Natural Sciences
Vestn. Ross. Obshch. sadov	Vestnik Rossiiskogo obshchestva sadovodov	Bulletin of the Russian Horticulturists' Society
Vest. Tifl. bot. sada	Vestnik Tiflisskogo botanicheskogo sada	Bulletin of Tiflis Botanical Garden
Visn. Kyivsk. bot. sadu	Visnyk Kyivsk'kogo Botanichnogo Sadu	Bulletin of the Kiev Botanical Garden
Vyzn. (or Vznachn.) rosl. URSR	Vyznachnyk rosllyn URSR	Key to Plants of the Ukrainian SSR
V obl. polupustyni	V oblasti polupustyni	(In the) Semidesert Region
Yadov. rast. lugov i pastb.	Yadovitye rasteniya lugov i pastbishch	Poisonous Plants of Meadows and Pastures
Zam. po sist. i geogr. rast. Tbil. bot. inst.	Zametki po sistematike i geografii rastenii Tbilisskogo botaniche- skogo instituta	Notes on Taxonomy and Geography of Plants of the Tbilisi Botanical Institute
Zam. po fl. EL'T	Zametki po flore El'tona	Notes on the Flora of Elton
Zap. Kievsk. Obshch. Estestv.	Zapiski Kievskogo obshche- stva estestvoispytatelei	Reports of the Kiev Society of Naturalists
Zap. NOVOROSS. obshch. Estestv.	Zapiski Novorossiiskogo obshchestva estestvoispy- tatelei	Reports of the Novorossiisk Society of Naturalists
Zap. Russk. geogr. obshch.	Zapiski Russkogo geogra- ficheskogo obshchestva	Reports of the Russian Geographical Society
Zhurn. Bot. obshch.	Zhurnal Botanicheskogo obshchestva	Journal of the Botanical Society
Zhurn. opyt. n. agron. Yugo- Vost.	Zhurnal opytnoi agronomii Yugo-Vostoka	Journal of Experimental Agronomy of the Southeast



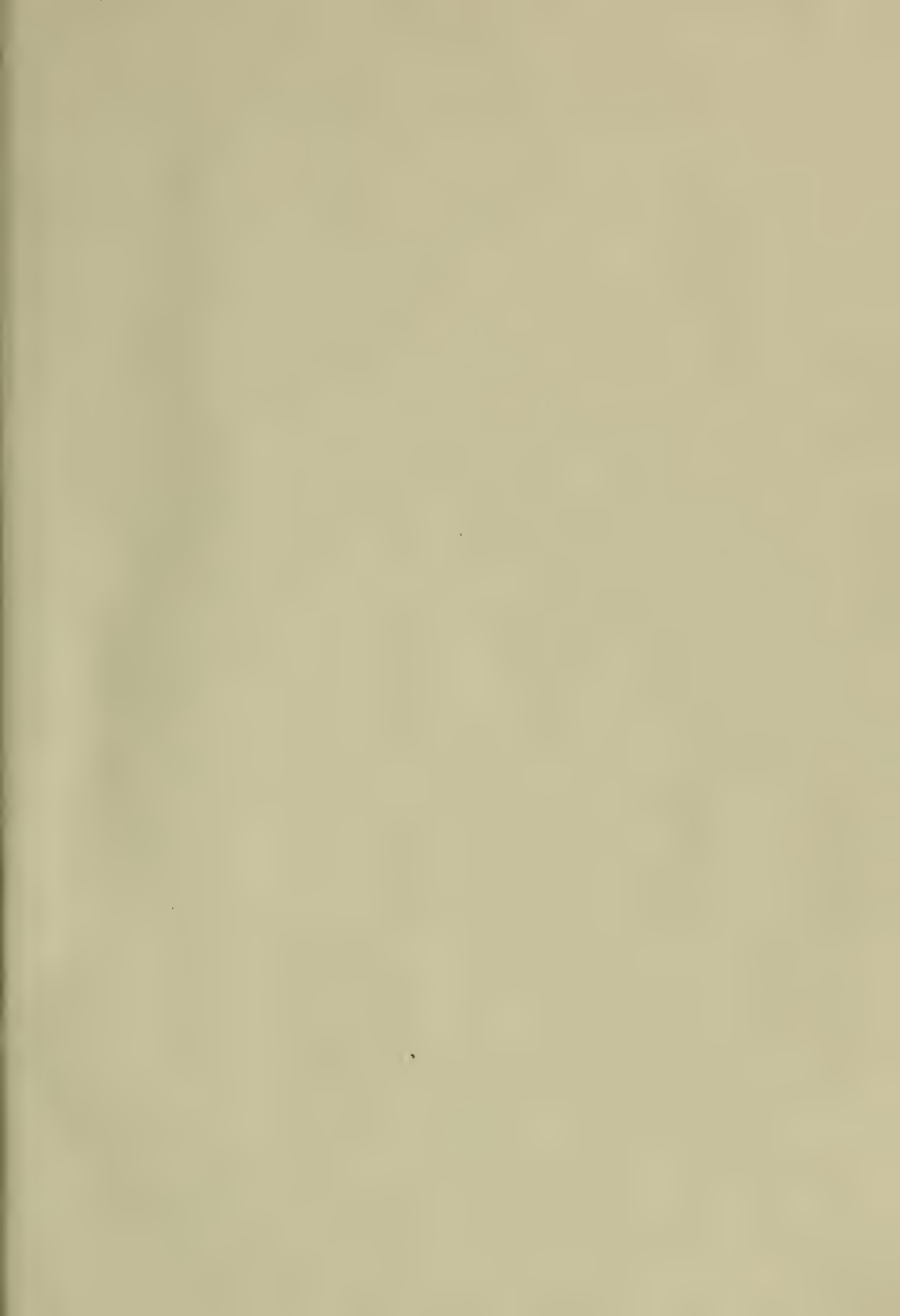
















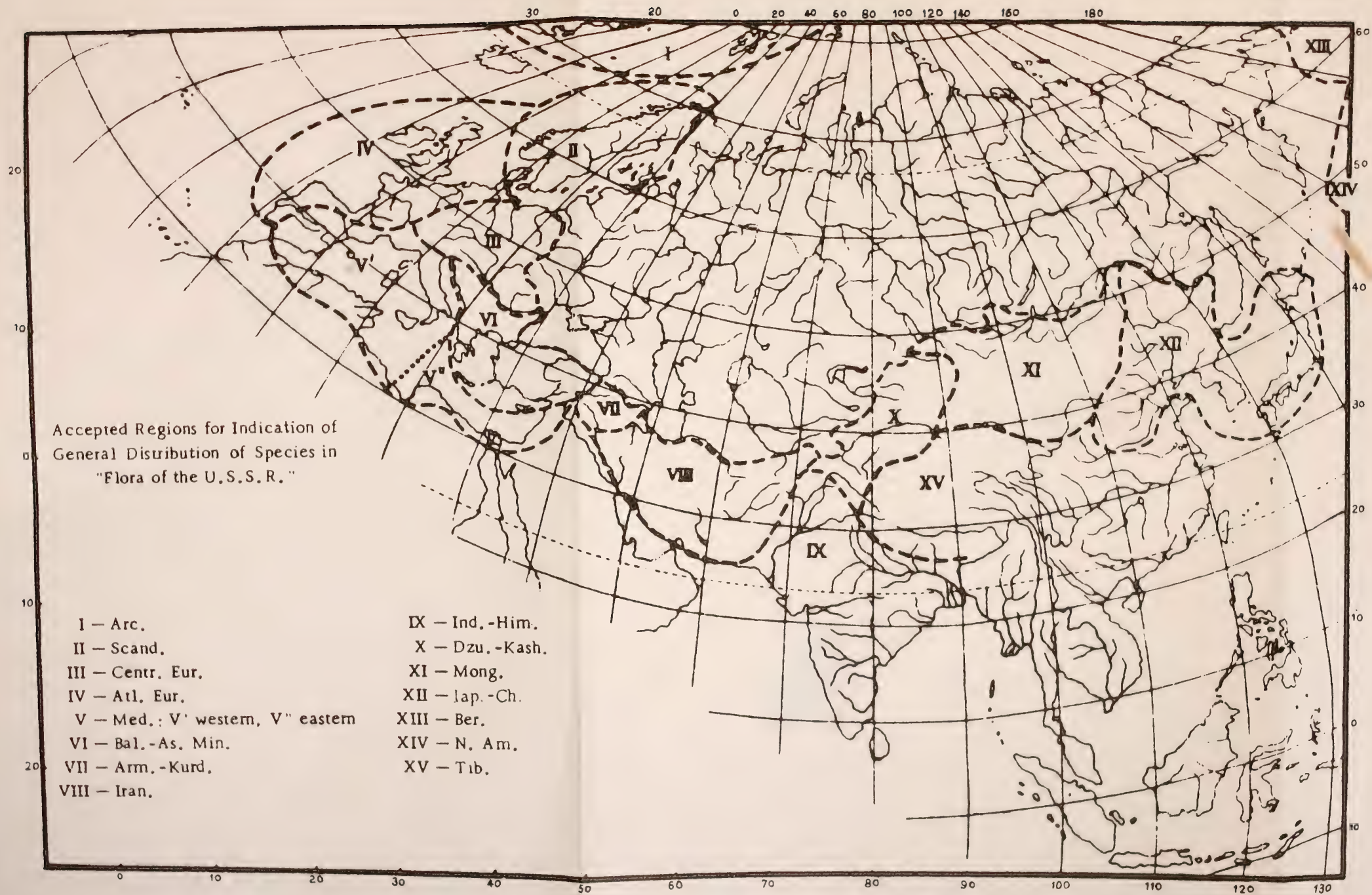
















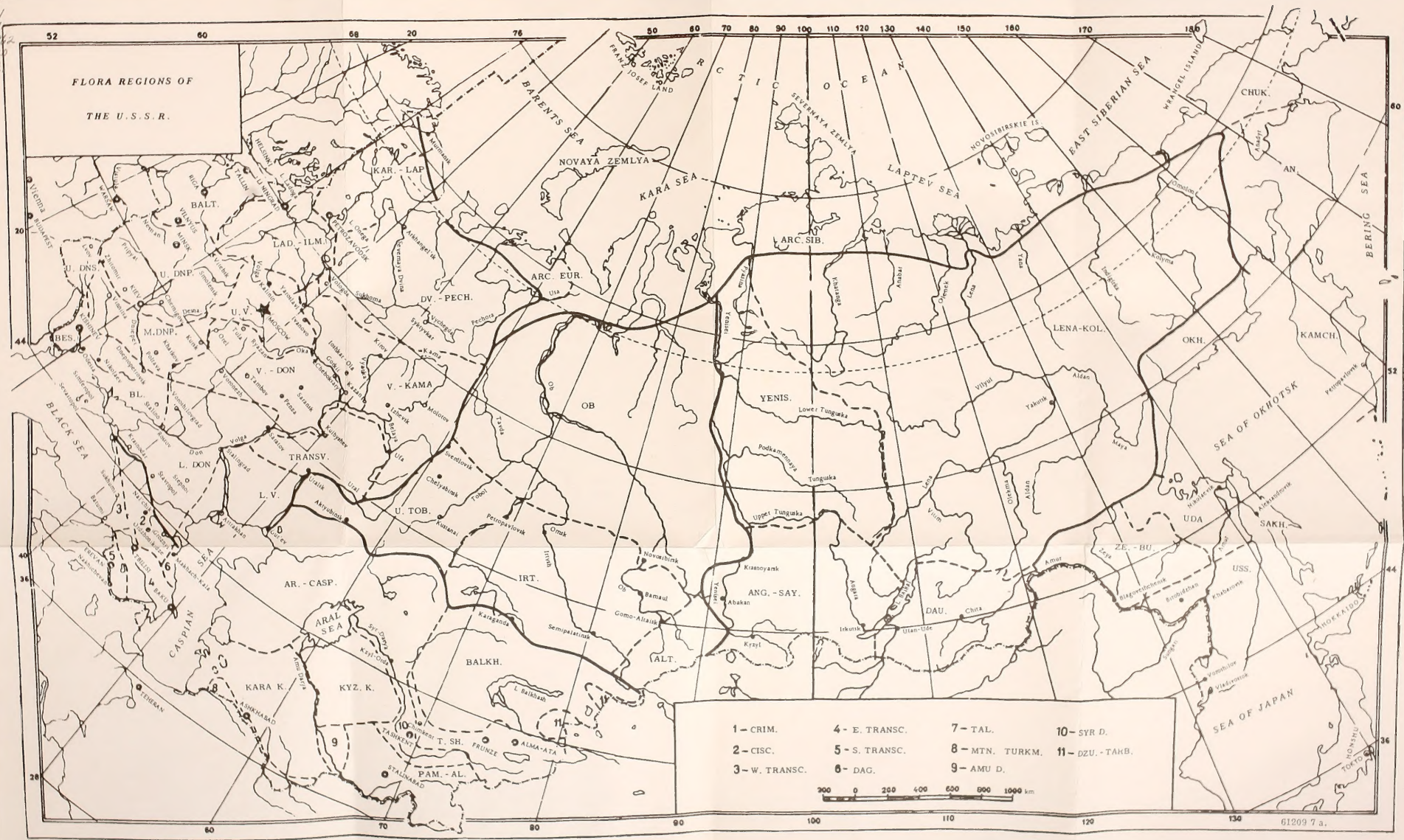






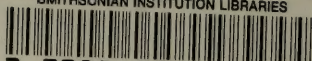


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